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GRAVEL ROAD WITH SURFACE APPLICATION OF LIQUID ASPHALT

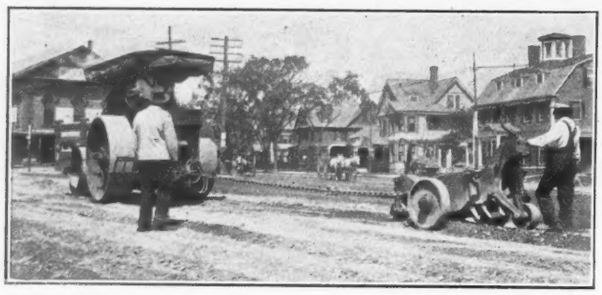
ROAD TREATMENT IN EASTERN MASSACHUSETTS

Work of the State Highway Commission, Metropolitan Park Commission, Boston and Neighboring Cities —Bituminous Macadam—Road Binders—Dust Layers—Methods, Costs and Apparatus

THREE years ago the macadam and gravel roads in Boston and Eastern Massachusetts were rapidly deteriorating, raveling badly from automobile and other traffic. Conditions were such that the question was even raised as to whether broken stone roads had not outlived their period of usefulness and would not have to be replaced by monolithic materials or blocks such as were commonly used in city streets. But a year ago it became evident that the dust nuisance due to the rapid disintegration of roads could be conquered. Even a casual general inspection of roads, at the present time, can hardly fail to convince the observer that the road builders have found ways to resist the destructive action of present-day traffic, with rubber and steel tires, and a general improvement of the roads throughout Eastern Massachusetts is apparent.

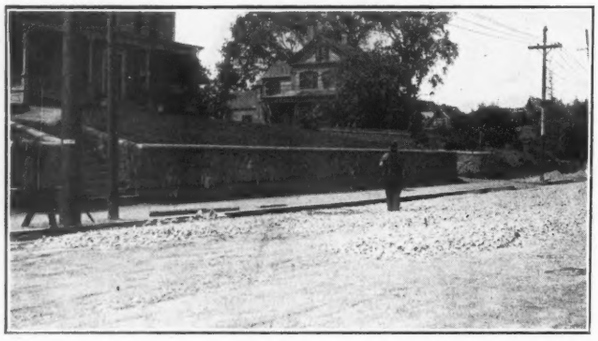
This condition is not the result of any new method discovered during the past year but to the general adoption of methods of treatment which have been tried for several years. The chemical treatment of roads in Massachusetts is firmly established as the proper practice and as a consequence it seems likely that macadam roads will have a new lease of life and be able to stand up under conditions formerly considered as impossible for them to bear.

Is this successful chemical treatment of roads a new burden on the community to be compensated for in indirect benefits, impossible of exact measurement, or is it a measure of economy and a positive saving? This question does not now admit of a simple positive or negative answer. The problem involves at least three items of expense—first, cost of construction of



LOOSENING MACADAM PREPARATORY TO LAYING TAR MACADAM SURFACE

new roads; second, maintenance by patching and renewal of the surface stone, and third, street cleaning and sprinkling. As will be seen from the instances cited, under some circumstances a better road than has hitherto been constructed can now be built at no increase in cost due to the chemical treatment. Suburban city streets can apparently, where all the items of cost enumerated are considered, be maintained more cheaply than before on account of the saving in watering. But it would seem as if out-of-town roads which have hitherto cost nothing for cleaning or sprinkling may, under the new treatment, cost more than formerly, though there is a good chance that their increased life may in the end result in an economy.

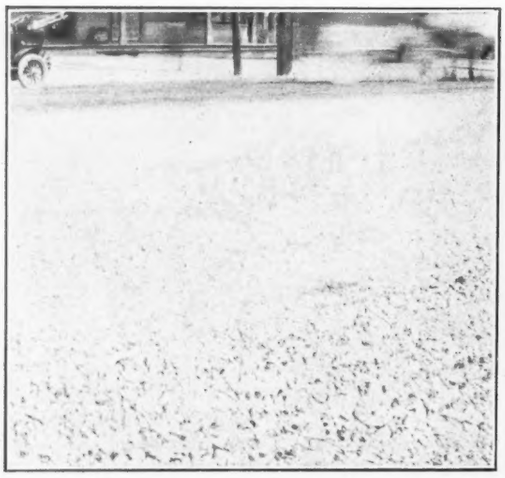


SPREADING TWO-INCH STONE SPREAD FOR MACADAM

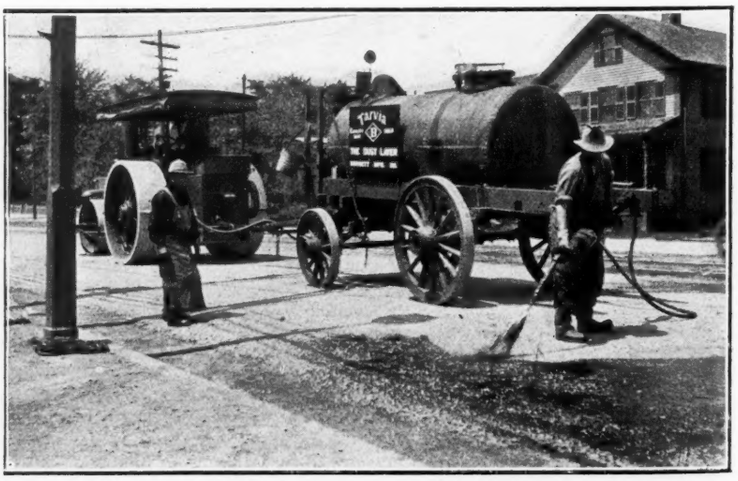
The most thorough and expensive construction now in use is the two-coat tar work in connection with a practical rebuilding of the street. Such a piece of work is now going on in the main road west from old Boston in the Brighton district. This is a road which, under old conditions, required extensive resurfacing amounting to reconstruction every fifth year. The methods of construction now employed are shown in the illustrations. The old surface was loosened by means of a scarifier attached to a steam roller. Some of the old material was hauled away but the road was so much worn that there was generally room for from four to six inches of new stone. This new stone is a clean 2-inch stone, well screened, containing neither larger nor smaller stones. This is important because stones of variable sizes would pack and prevent the tar applied later, from running through it and making a well bonded tar base. After spreading, the stone is well rolled, when it is ready for the first application of tar. Tarvia X was used, and the quantity was one and one-half gallon to the square yard. The method of applying the tar is somewhat novel. Cylindrical iron tanks bring the warm melted tar from the works, the tanks containing upwards of a thousand gallons. The tank has three important pipe connections—an inlet for live steam, a steam gauge connection, both at the front of the tank, and an outlet with valve and nipple for the hose used in distributing the tar. The tank is pulled in onto the rolled 2-inch stone, the horses taken out and the steam roller backed up to it. Steam from the boiler of the roller is delivered through a steam hose into the tar tank until the steam gauge shows a pressure of 20 pounds, by which time the tar is heated to a temperature of about 150° F. Then the steam pipe is disconnected and the tank wagon attached to the roller by a chain so that it can be pulled forward as required. The tar is discharged in a spray with considerable force through a hose which has a brass distributing nozzle. After the 2-inch stone is covered, after an interval of a few hours, clean ¾-inch stone is spread over the surface and rolled in, fine stone being added until a good close surface is obtained. Over this surface one-half gallon per square yard of heavy tar is spread by the same method as before. This is covered with pea stone—about ¼-inch clean stone—and rolled, and the street is finished.

On one street which was reconstructed according to this system last year, the surface is now in practically perfect condition, well closed up with fine stone and not noticeably friable or dusty. An open trench in the street gave an opportunity to examine the structure. The tar was distributed well through the base, forming a good tar concrete. The finer material at the surface was hardly as thick and solid as in a bitulithic pavement but the general appearance of the surface is the same and it is water-tight.

As to cost of construction, the section laid last year cost 61 cents per square yard—a sum no greater than would be paid for the old style plain macadam. The reason for this is not apparent at sight, but is explained by Division Superintendent F. M. McCarthy as follows: The old method was to cover the surface of the coarse stone with screenings, perhaps 2 inches deep and by watering and rolling work them down into the body of the coarser stone. The tar macadam saves about 2 inches of screenings and a heavy labor and equipment expense for watering and rolling. This, the superintendent figures, amounts to just about the cost of the 2 gallons of tar or 16



TAR MACADAM. SURFACE OF 2-INCH STONE AFTER ROLLING; BRIGHTON



HEATING TAR BY BOILER AND DISCHARGING UNDER PRESSURE

TAR MACADAM SURFACE, ONE YEAR OLD; BRIGHTON

cents. The tar macadam, judging by appearances and in view of the general experience with bituminous construction, is the more durable road.

Next in durability and permanance in their effects are road binders, both tars and oils. The distinction between a road binder and a road oil is by no means sharp, either as to the materials themselves or the way in which they are used. In general a bituminous road binder is heavier than a road oil. When used in construction, the oil, tar or asphalt cannot have much binding effect unless considerable new stone is added to the road. An oil simply sprinkled, poured or sprayed with force onto the tar surface of an old road cannot penetrate it very far, although some bitumen may find its way down around the stones if they are loose. In time a sort of fractional separation of the oils may take place and the lighter oils may soak down through the stone dust or clay which fills the voids among the larger stones and give it added binding properties. But a binder, if the word means a liquid cement holding stones together, to be effective must be applied to the surfaces of the stones when they are clean and loose. An examination of the work actually going on shows that the distinction between binder and road oil is vague.

The greatest single user of road oils and binders this season is the Massachusetts Highway Commission, of which Arthur W. Dean is Chief Engineer. About 250,000 gallons will be used, enough to surface about half a million square yards of roadway. Last season the Commission treated 115 miles with a bituminous surface coating, nearly 104 miles being coated with asphaltic oil and over 11 miles with refined tar. In the annual report for 1909 the methods of using the binders are described, and it is stated very frankly and impartially what they have accomplished and what it is hoped they may do. This descrip-description is as follows:

BITUMINOUS WORK

Uncertainty as to what methods and materials are best for obtaining roads that will withstand modern traffic has caused the commission to continue the construction of experimental sections of road, the object of these experiments being to find what treatment is the most economical, considering the cost of construction and maintenance combined, not separately.

Records are made of the minutest details of each method tried, and close observation of the results obtained will enable the commission in the near future to determine what methods or treatments can be most wisely adopted. Every bituminous binder used has been analyzed, over six hundred analyses having been made during the year.

The satisfactory results obtained by giving the roads a light surface coating of refined tar or heavy asphaltic oil has led to extensive use of this treatment; and for the more economical and effective application of the material the Commission purchased in England two machines for spraying the bituminous material under pressure, by the use of which machines a very thin coating of oil or tar can be spread uniformly, using ¼ gallon or less to the square yard.

A general conclusion has been reached by the Commission as a result of work done up to this time, namely, that in many instances some bituminous binder must be used in the first construction of a road, and that no positive determination of the exact nature of the binder that will be the most economical in construction and maintenance can be made until more time has elapsed to demonstrate their qualities by actual use on the roads. Meantime, until such determination can be made, the Commission considers it advisable to use in general only the commonly used and comparatively inexpensive surface treatment of bituminous binder, using about one-half gallon to the square yard of surface, and covering with stone screenings, fine gravel or coarse sand. This treatment preserves the road, renders resurfacing less urgent, and lays the dust. The general use of oil or other dust layer instead of water has largely increased during the year, possibly because of the law adopted last winter, as recommended by the Commission, allowing cities and towns to assess upon the abutters or take from the tax levy the whole or a part of the cost of using these dust layers instead of water.

There are a few principles which the experience of the Commission leads it to believe will become universal in future bituminous work. Bituminous surfaces should have less crown than the ordinary macadam road. While the customary crown on macadam roads is ¾ inch to the foot, a crown of ⅜ inch or less has been found to be probably sufficient and possibly more desirable than a greater crown on bituminous surfaces. Experience has also shown that with both automobile and horse traffic on a bituminous road it is advantageous, particularly with roads made by mixing or grouting tar in the top course, to apply a surface sealing coat, preferably of asphalt, as that seems somewhat less slippery, gives a better appearance, and, at the present writing, shows indications of longer life than a surface coating of tar.

An oil or tar, to be useful on a road, must bind the materials together; it must be tenacious and adhesive—a binder, not a lubricant. One can tell almost as soon as one begins to use a material whether it works well or not; at any rate, at the end of one or two days, when it has had time to set.

It seems evident that the failure of some of the materials to give satisfaction may be due to superheating, which causes them to lose their adhesive properties; or a material may be mixed or thinned or fluxed with a material which is of no value as a road binder, thus taking away the natural adhesiveness of the asphalt or tar that is fluxed with it.

The Commission cannot, at this time, announce any specifications which it would feel satisfied to recommend for general adoption.

The Commission, however, has had Mr. H. W. Clark, the chief chemist for the State Board of Health, at work all this season making analyses and experiments, which have proved to be of great value, and it hopes before long to adopt specifications which will insure the securing of good road material. Mr. Clark's report will be found in the appendix.

RESULTS OF THIS SEASON'S WORK

It is perhaps not too much to say that, while the Commission has used various bituminous binders, both with tar and asphalt bases, has employed various methods of construction and resur-

AITKIN TAR DISTRIBUTOR
Used by State Highway Commission

facing and various methods and materials in surface coating, the roads where these materials have been used have almost invariably been in very satisfactory condition at the end of a year. They are certainly in better condition than most of the roads where no such materials have been used.

In only a very few instances have the roads failed, or gone to pieces, to any great extent. Some places have had to be patched, and occasionally certain spots have required extensive patching, but in the main, while some are much better than others, it is true that almost every one of them is reasonably satisfactory. The failures have been very few and of very slight extent.

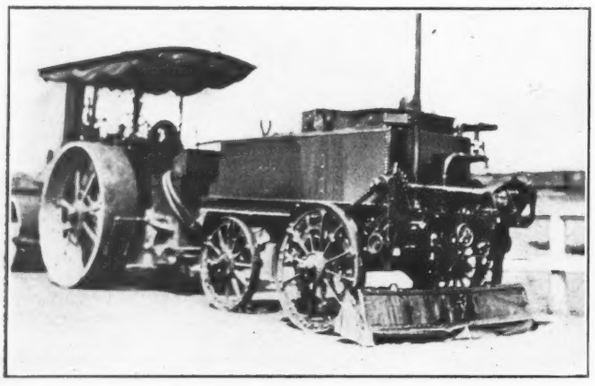
It is because of the indications as to comparative wear, because of slipperiness, etc., that the Commission has been led to adopt one material rather than another.

It can fairly say, however, as a result of this season's work, that the use of bituminous binders in road material has, in its opinion, come to stay, and will be much more prevalent in the future than it has been in the past wherever there is much automobile traffic.

The doubt that exists is not as to the use of some bituminous binder, but which binder to use, and exactly what is the best method of applying it. It will undoubtedly be found that different localities and different materials require somewhat different binders and treatment, and by experience alone can a determination be made as to what will be the best to use in any given locality with the materials that are there available.

Methods of Application

The English spraying machines, purchased by the Commission, are in very common use in England, where many hundreds of miles of road are sprayed with tar annually, and their use in that country is constantly increasing.



TAROADS TAR DISTRIBUTOR
Used by State Highway Commission

It has been the practice in England to spray a thin coating of tar over the road without previously preparing the road surface to any great extent. The tar is spread in a very thin coat, the first coat varying from one-third to one-quarter of a gallon, or even less, to the square yard of surface. A second coat, sometimes being only one-eighth or one-ninth of a gallon to the square yard, is then applied. The English gallon, however, is about one-sixth larger than the standard gallon of this country.

The spraying machines which the Commission purchased are made to hold the tar, heat it with a steam coil by means of steam provided by a traction engine or a steam roller, and spread it upon the road in a thin and even coat. The tar is kept under pressure by pumps geared to the wheels, so that a pressure is developed by the movement of the tar-spraying machine itself.

The tar is spread hot upon the road, under pressure, through a number of fine nipples which make a very fine spray and cause the tar to spread evenly over the road and into the depressions. The nipples are on a long tube, and have a sort of hood to prevent the tar from being blown to one side by the wind. The machines work very well in applying an even coat of about one-quarter to one-third of a gallon to the square yard. Their use has given very good results, particularly in putting on one coat of tar. The machines have been hauled behind the steam roller which provided the steam for heating the tar. This method of hauling is, of course, somewhat expensive.

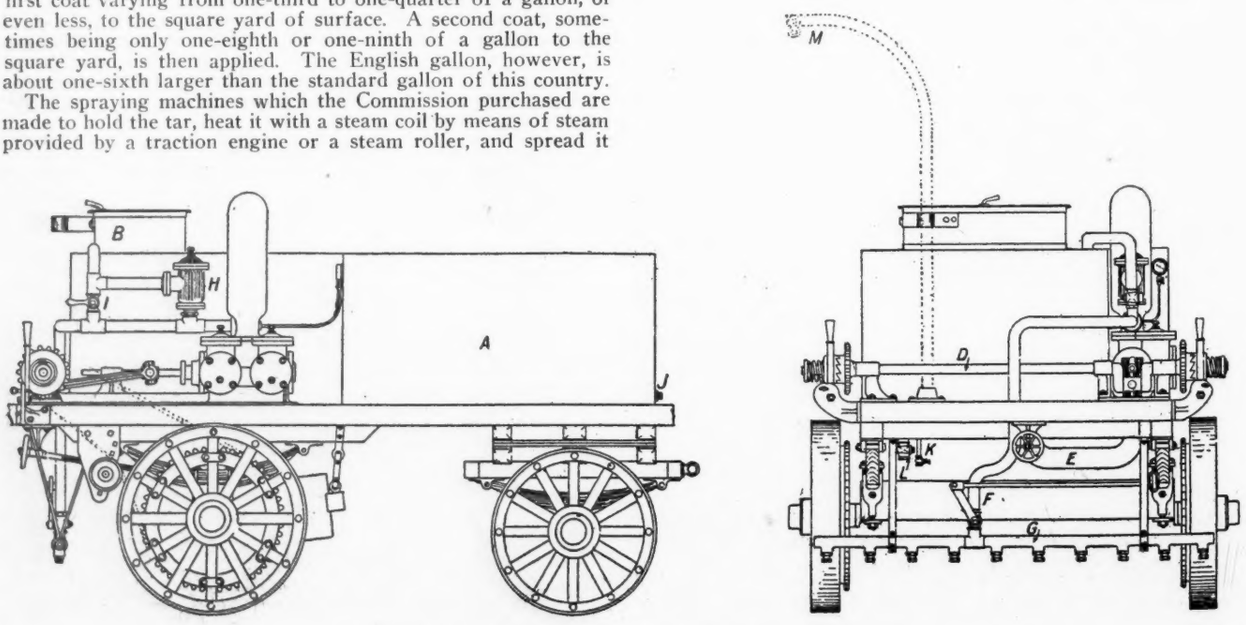
Early in the year the Commission used heavy asphaltic oil in the spraying machines, and the machines worked very well on this work. At the beginning of the season the Commission was handicapped by the inexperience of the persons selected to operate this particular type of machine, as no similar machines had previously been used on work in this country, and the costs of the work done were necessarily high, inasmuch as proper arrangements could not be made for the continuous use of the machines. Toward the end of the season, however, the costs were very much reduced.

One coat of oil, using one-fourth gallon to the square yard, including the cost of sand, oil, labor and expenses in connection with the steam roller, can probably be applied at a cost of less than 5 cents per square yard.

While the work of applying the oil by means of a spraying machine has been more economical than coating roads with oil in any other manner, it should be borne in mind that a smaller quantity of oil is used per square yard. It seems probable that a single coat of one-quarter of a gallon to the square yard will not be sufficient except upon roads which are in good condition. One-half gallon of oil to the square yard appears to give better results on most roads.

In other oil and tar work the material has been spread in various manners. The lighter oil was, in one instance, spread from a sort of trough made of two boards with an opening at the bottom, which was mounted on wheels and which received the oil from a barrel. The American Tar Company's distributer has been used, with very good results, where the quantity of material to be spread was about one-half gallon to the square yard. Oil has also been applied from an ordinary half-moon watering cart. When the heavy asphaltic oil has been used, it has always been necessary to heat and apply it hot.

The cost of the surfacing work has varied greatly in different localities, as it depends largely on the length of the haul, the cost of the sand or gravel covering, and on whether or not the oil or tar was purchased in tank car lots or barrel lots. When the heavy grade of oil has been used and applied hot, at the rate of one-half gallon to the square yard, the cost has varied from 6 to 11 cents per square yard, which cost includes the cost of material, labor, and the surface covering of sand, gravel or stone screenings. In many instances these costs included considerable patching which it was necessary to do in order to prepare



TAROADS DISTRIBUTOR. SIDE AND REAR VIEWS

the road surface for the oiling. In general, it may be stated that a fair price for such work, complete, is from 6 to 8 cents per square yard.

On account of the increased efficiency of the employees of the Commission, because of the experience gained during the past season, the cost of the work done with the tar-spraying machines will probably be largely diminished.

In all cases, before applying bitumen to a road, the surface should be carefully prepared, thoroughly cleaned and compacted, all holes and depressions filled, and the roads brought to as true a crown and grade as possible. The oil or tar should then be spread as evenly as possible over the surface of the road, brooming it where necessary to secure a uniform coating, and covered with sharp sand, gravel or stone screenings.

During the first few weeks after the road has been treated, covering material should be added whenever the oil or tar appears upon the surface.

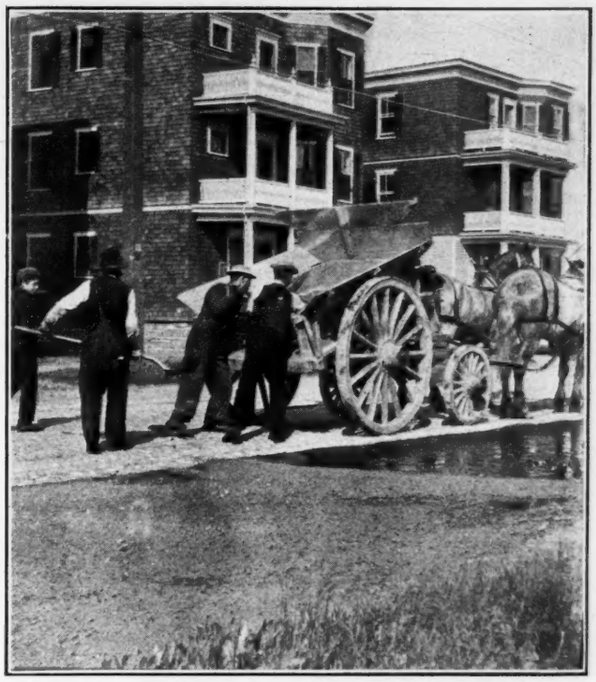
If holes or depressions are left in the road, the water which lodges there soon causes the road to become raveled.

Roads surfaced with any bituminous binder must shed water, or they will quickly go to pieces.

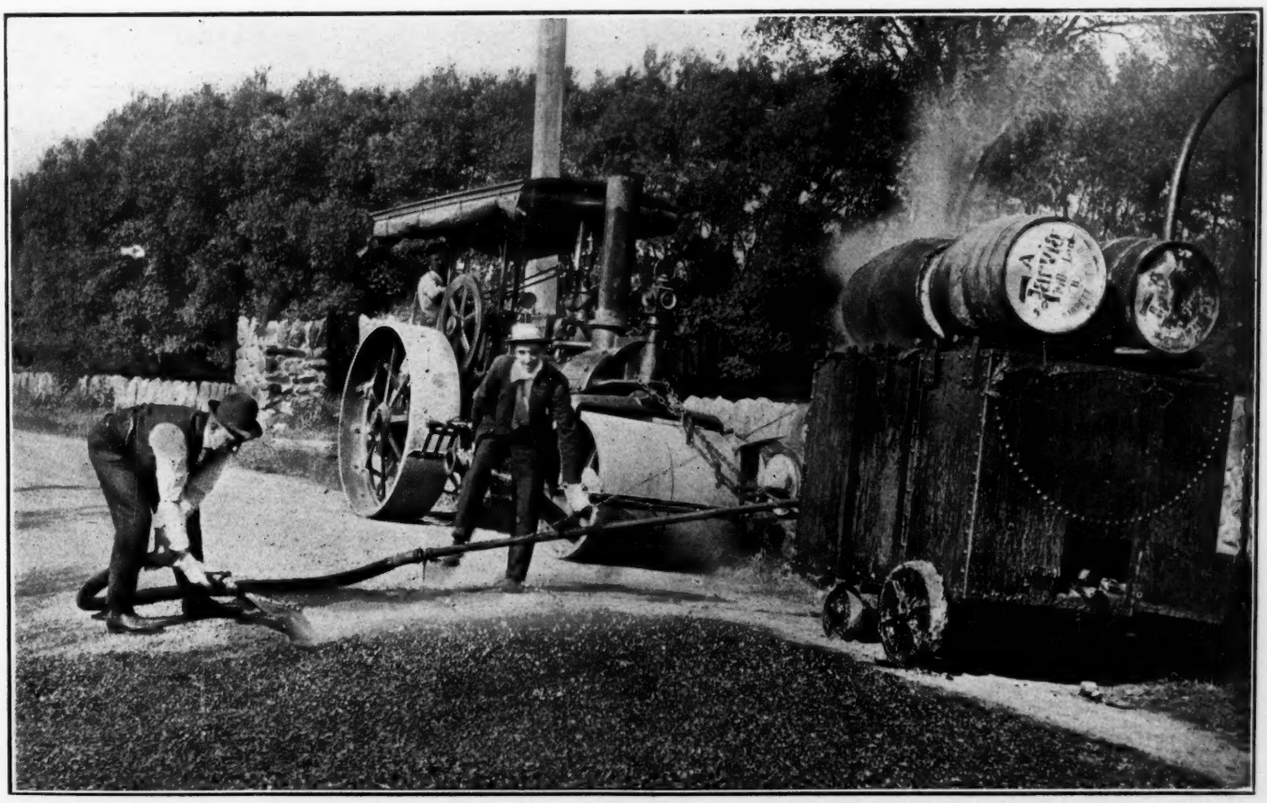
Dust pockets or loose material will invariably cause the surface to peel or scale. A road should be patched as soon as any scaling appears on the surface.

All loose material should be cleaned out of depressions, or the edges made straight, before the bituminous material is applied. The depressions should be filled with heated sand, gravel or chips, thoroughly mixed with hot oil or tar, and tamped into the depressions. Another method is to sprinkle the hot oil or tar into the depressions, after it is prepared, covering the material with all the sand, gravel or chips which it will take up. The material should be tamped and the process repeated until the depression is entirely filled.

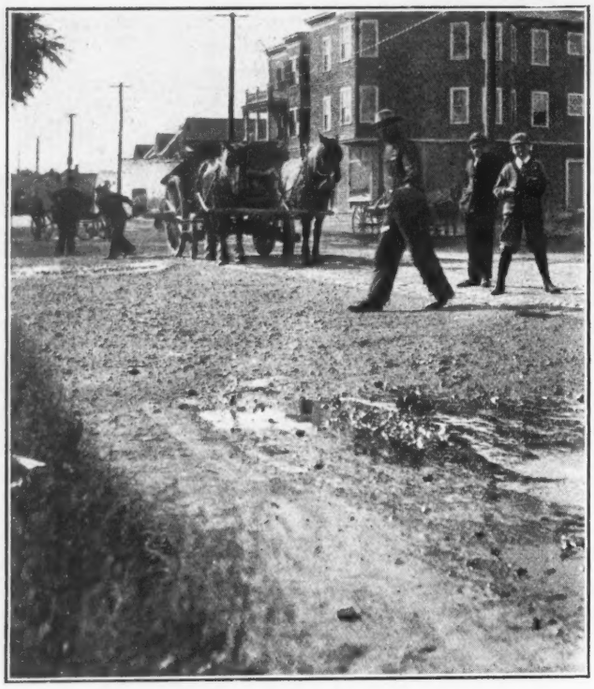
There is hardly a town in eastern Massachusetts that is not using surface applications of bitumen. The illustrations show work on Broadway, Arlington, where the Standard Oil Company's road oil was being laid two weeks ago under the direction of Town Engineer Robert W. Pond. The surface of the roadway was cleaned and holes were filled with macadam. The oil was then applied by means of the Standard Oil Company's oil-distributing attachment on an ordinary watering cart in the proportions of from ¼ to 1/3 gallon per square yard. Men with brooms swept back over the drier portions of the road any oil that accumulated in pools. Wagons of coarse, clean sand containing a little gravel were brought alongside the work, the wagons traveling in the car tracks, which were in the center of the street and were not given the oil treatment. Part of the sand was thrown from the wagon and the rest was dumped out at the back, and it was scattered by men with shovels over the oil until no free oil showed through. A cubic yard of sand covered from 20 to 30 square yards. The road may be closed for a few hours or a day after the sand is spread. Mr. Pond figured that the work was costing altogether about 7 cents per square yard and that it will last a year or perhaps two years. At any rate, some benefit is expected to be derived in the second year from the first year's work. A



SPREADING SAND OVER STANDARD ROAD OIL
Sanded surface in foreground



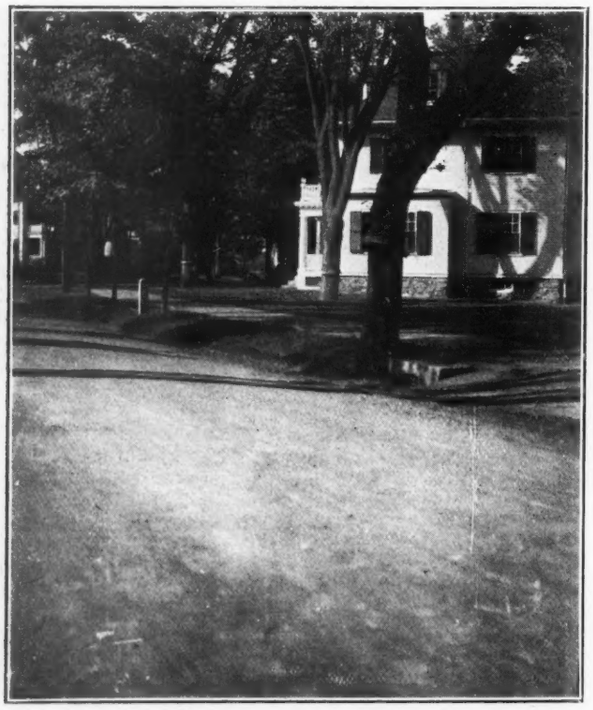
RESURFACING WITH TAR MACADAM. HEATER AND SPREADING NOZZLE
Massachusetts Highway Commission



SPREADING SAND OVER STANDARD ROAD OIL
Oiled surface in foreground

narrow street having a car track and considerable traffic of steel-tired wagons (all Massachusetts road makers have learned to distinguish between automobile traffic and steel-tire traffic, each requiring a different treatment), was flushed with tar last year. About half of the bitumen still remains and it will be flushed over again this year.

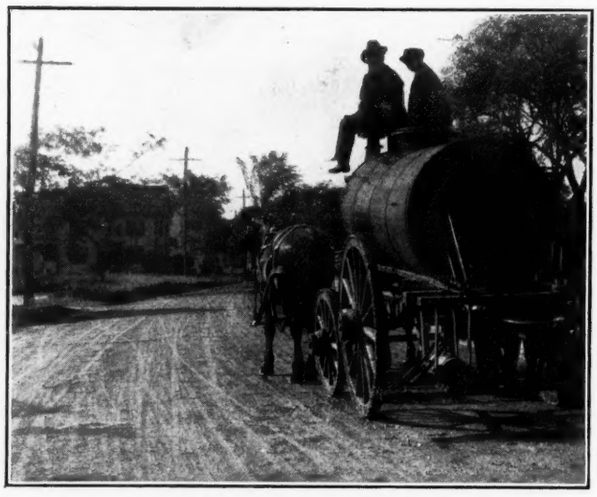
The Metropolitan Park Commission, John R. Rablin, Chief Engineer, have used and will continue to use much road oil for park roads and the highways under their control. Last week Indian road oil was applied on the Lynn Beach Reservation, Lynn, Mass. This oil has been in use for several years in the Revere Beach Reservation and experience there has shown that one application of a gallon per square yard will stand



TREATED WITH OIL EMULSION. ONE YEAR OLD
Needed resurfacing when treated

the sort of traffic to which it is subjected for two seasons; in fact, it remains in fair condition even into June of the third year. A Price oil distributor is attached to the rear of a wagon of oil and an attendant regulates the valve. The advantage of this device is that as soon as one tank has been used up, another can be attached to the distributor and the work proceed without interruption. The sand, which is medium coarse, is delivered alongside the road in advance of the work. A gang of 20 men distribute it. On one day a gang laid six tanks of 600 gallons each, covering at least 4,800 square yards. The roadway in this instance was in practically perfect shape and needed no filling, but it had been swept. For several years previous it had been treated with calcium chloride.

One reason why the Park Commission prefers the road oil treatment to oil emulsions or calcium chloride is that it simplifies their work and saves permanent organization. When the road has been treated in the spring, all work on it for the season is done, except for a trifling amount of cleaning and perhaps patching, and therefore the stable expense and big payroll are avoided. As compared with the Arlington work, the amount of oil was greater and the labor expense of fixing up the road in advance of the oiling was less. Allowing 1 cent per square yard for cleaning, 2/3 gallon of oil at 8 cents, and labor and team spreading at $57 a day, on the basis of the day's work



STREET SPRINKLER FITTED WITH STANDARD OIL DISTRIBUTOR

mentioned, and allowing 1/50 of a cubic yard of sand, costing two cents, the cost would be 9.7 cents per square yard. Regarding the method of delivering sand in advance of the work, it may be said that this is the general custom among contractors for State work and, on account of its avoiding delays, is the cheapest method except where hauls are short and the whole work under the eye of the superintendent in charge.

Not far from the Park Commission's work in Lynn, on the highway from Lynn to Salem, the State Highway Department is giving a bituminous surface treatment to the roadway, using Texas oil. The surface generally is sanded instead of being sprinkled with pea stone. The road looks fine, and has a well rounded contour. The asphaltic oil is thick and viscous, and feels like rubber under foot. More than half the traffic consists of automobiles. An open ditch in one section of the work afforded an opportunity for an investigation on the subject of penetration. A thin, black layer, perhaps a quarter or three-eighths of an inch thick, lies on the surface. Below this, in places for a depth of an inch or more, a slight discoloration is perceptible, showing that some oil, presumably light oil, has penetrated the old road metal. It is doubtful whether it has much binding property, however, and the road must depend for its durability on the layer of rubber-like asphaltic surface. Automobiles seem to have no effect on it, and there is little steel tire traffic, which, if heavy, might be more injurious.

In Reading, on the highway which, in Andover, is used for experimental purposes, some surfacing work is going on. Here

the old roadway is being built up a little with three-quarter-inch stone and coarse sand and gravel. The asphalt here presumably has a true binding effect on the new material. The steel tire traffic on this street is considerable, and probably a greater thickness of material mixed with bitumen is needed. Many miles of this highway have been surfaced, and in places show considerable wear, but are far from being worn out, and when the low cost is considered it is hardly possible to doubt that a real advance in roadmaking has been made here.

A State experimental road was laid during the latter part of last summer. It consists of about 3000 linear feet of roadway heavily travelled by both automobiles and steel-tired vehicles. An inspection of this roadway is instructive, although the conclusion that a section not showing up well was constructed of poor material would be too hasty, for there are questions of material, workmanship and traffic to be considered. However, in a general way it shows several things. The difference in appearance of tar and asphalt surface is plain. The statement made by Prévost Hubbard in his recent book on "Road Preservatives," that tar is a stronger binder than asphalt, but less stable chemically, is readily confirmed. The desirability of having a high percentage of hard asphalt mixed with the oil seems evident, although from the appearance of one section the suspicion is aroused that difficulty in mixing with the stone and sand sets a limit to the percentage of hard asphalt that can be

TAR MACADAM AT WENHAM, MASS.
Seven months old. Gritty, but as smooth as ordinary sheet asphalt

used. Beyond this limit hand or machine mixing with hot material would be necessary.

The following notes on the present condition of the experimental road in Andover, laid under the direction of the Massachusetts State Highway Department, were made during an inspection made by the writer two weeks ago. The nature of each section is indicated by signboards, the wording given below in italics:

Liquid asphalt (reheated): Surface of stones covered, greasy, flows on hot days in spots, apparently recently sanded.

Asphalt oil "A": Good, close but porous surface, no large stones showing, hard and not greasy.

Texaco asphalt and fluxing oil 1 to 2: Good, close surface, generally hard with a few greasy spots, large stones show through in a few places.

"A" asphalt and fluxing oil, 1 to 1: Good, close surface, few small greasy spots.

Texaco asphalt and fluxing oil 1 to 2: Good, close surface, some greasy spots.

Genasco (heavy): Good, close surface, few large stones show through, very few greasy spots.

Genasco (light): Indistinguishable from adjoining section.

Sarco compound: Good, hard surface throughout; most of stones, even the finer ones covered with bitumen, but no surplus and no greasy spots.

Cabot's No. 8 road tar: Close, hard surface, little bitumen showing, no surplus bitumen running out, surface slightly friable.

Standard Oil Company's asphalt and oil, 1 to 2: Close surface, generally covered with bitumen, somewhat oily in places, surface broken through in a few places.

Standard Oil Company's asphalt and oil, 1 to 1: Close surface, mostly covered with bitumen, no greasy appearance.

Standard Oil Company's asphalt and oil, 2 to 1: Hardly distinguishable from former, except occasional lumpy appearance as if bitumen had been too thick or too cold to mix well.

Two hundred and twenty-five deg. C. water gas tar with 10 per cent asphalt: Surface friable and dusty with occasional greasy spots.

Two hundred and twenty-five deg. C. water gas tar with 33 per cent asphalt: Surface friable, slightly dusty, no greasy spots, surface unbroken.

Two hundred and seventy-five deg. C. water gas tar: Surface friable and dusty, but generally good.

Twenty-five per cent Lawrence Tarvia: Good, close surface, slightly friable.

Thirty-five per cent Lawrence Tarvia with "A" asphalt, 4 to 1: Good, fine unbroken surface, very slightly friable.

Thirty-five per cent Lawrence Tarvia with 15 per cent Lawrence Tarvia, 4 to 1: Scarcely distinguishable from adjoining section.

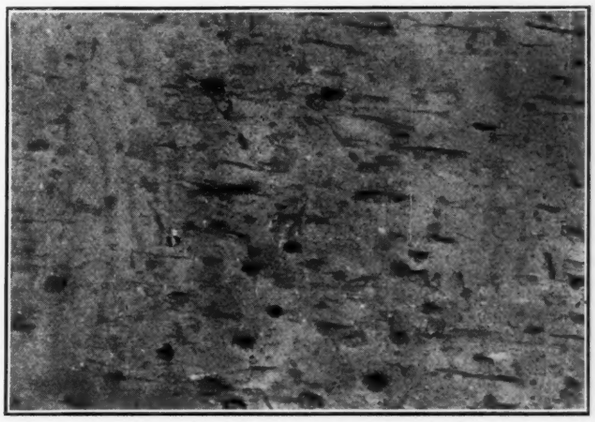
Aspho Tarite: Good, close surface, much like previous section.

One inch of No. 2 stone, grouted with 35 per cent Lawrence Tarvia, etc.: Surface lumpy, with rich bitumen and dusty, looks as if recently patched with some asphaltic material.

Three inches of 1-inch stone grouted with Glutrin: Hard, even surface, unbroken, but dusty.

Three inches of 1-inch stone, sand filled, oil painted: Stone mostly covered with bitumen in places and bare in others, some greasy spots, dusty.

New York specification macadam binder (grouted): Comparatively even surface, generally covered with bitumen at one



MACADAM REPAIRED WITH TOP LAYER OF SAND AND HEAVY ASPHALTIC OIL
Eight months old

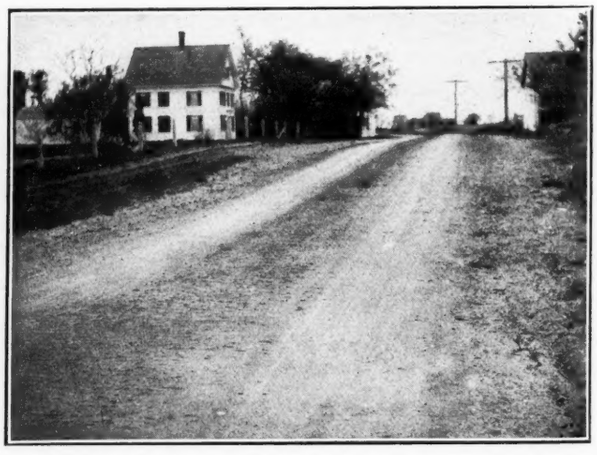
end of section and bare with large stones showing at the other.

No. 1 stone, sand filler, oil painted: Bare of bitumen, slightly raveling.

The cheapest treatment for streets is the application of oil emulsions or of calcium chloride, which in a general way are considered as dust layers rather than road preservatives. Interesting though somewhat conflicting evidence on this point may be obtained by close examination of individual streets, together with the record of the treatment they have received. The statement of Superintendent Guy C. Emerson, of the Street Department, Boston, that during the season of 1909 he treated nearly all of the macadam roadways in the city—about 5,000,000 square yards—with oil emulsions at an average cost of 1.8 cents per square yard, is strong evidence in their favor. Calcium chloride, which is in the same class as a substitute for the former system of watering, was applied to 400,000 square yards. There is more or less complaint from citizens regarding the injurious effects of oil to clothing, carpets, etc., and it is not wholly without cause. The stains of tar and asphalt are easily removed by benzine, and it is said that almost every household contains a bottle of benzine, which is used pretty regularly. The bitumen complained of comes from the streets flushed with road oils and binders, especially when they are fresh, or on very hot days; but the emulsions, on account of their more frequent applications, are the worst offenders. This inconvenience is considered as trifling, however, as compared with the benefits,

as the increasing use of bitumens shows. The frequency of application of an emulsion depends upon the character of the street on which it is used, and varies from two or three applications in a season to a treatment every two weeks. The Metropolitan Park Commission has practically abandoned the use of emulsions. Their experience is that, as used on their roads, no benefit is derived in the second year from the previous year's treatment. On other kinds of streets the contrary seems to be true. For example, Pleasant street, Arlington, was treated last year with Terrecolia and Standard emulsion, and the street watering service withdrawn, to the general satisfaction of the owners of abutting estates and the general public. The cost of the treatment was 2½ cents per square yard. When the treatment began the street was almost in condition to require resurfacing. At first two applications of 8 per cent emulsion were given at intervals of a week, so as to form at once the characteristic oily surface caused by this method. After that applications were given at intervals of a few weeks. This spring the effect of the oil still remained, the street was in generally good condition, and will probably remain good throughout the year, with perhaps half a dozen applications during the season. No sweeping of the street was necessary. The roadway is well crowned, and automobiles work what fine material forms down into the gutter, where it is occasionally cleaned up by laborers.

SAND ROAD IN BARNSTABLE COUNTY



SIMILAR ROAD AFTER TREATMENT WITH HEAVY OIL

The fine main thoroughfares leading west from the Back Bay district, Boston, are interesting examples of what emulsions will do on rather heavily traveled streets. That they are not entirely satisfactory, or at least that better results may be possible, may be presumed from the fact that this year two of these sections of considerable length have been given surface treatments, one with a tar binder and the other with an asphalt binder.

The cost of emulsion treatment of 1.8 cents per square yard, of course, does not cover the cost on such streets as Commonwealth avenue and Beacon street. Here the applications of emulsion must be more frequent, and there are other expenses. On streets of this character an oil scale of fine material collects on the surface of the road, and other fine material is pushed down into the gutters. Laborers keep throwing this fine stuff back on to the roadway, particularly over spots where bare stones show. Besides this, at times thick accumulations of scale are broken up with a light harrow and scattered about. The condition of the roadway on the down-town end of Commonwealth avenue looks as if the traffic were too great for the emulsion treatment. There are a good many bare places, with large stones showing, and some raveling.

By digging into the macadam with a knife it can be seen that the oil has penetrated into the roadway and really has some binding effect. The oil of the emulsion is lighter than road oil, and will probably penetrate where the latter would not. Moreover, light hydrocarbon oils, though more volatile, are more stable chemically than heavier oils of the same series. With the exception of the down-town ends of these Back Bay thoroughfares, the general condition of the streets appears to have improved, the amount of bitumen in the roadway has probably increased, and at times in places it looks almost like an asphalt pavement in appearance, the bright, glossy and greasy appearance given by the light oil being the principal difference.

Calcium chloride is in about the same class as the oil emulsions as dust layers. It is far superior in the general appearance that it gives to the street, but may be inferior in its road preserving properties. Besides having been used in Boston on nearly half a million square yards, it has been used extensively in Brookline on residential streets. The effect of these streets to the eye is very pleasing to the traveler who has been riding for miles over tar and asphalt roads, and to many this characteristic will have great weight in the choice of a dust layer. The common method of applying calcium chloride has been to dissolve it in water and apply it in sprinkling wagons, the amount used being about ⅓ pound per square yard. More recently the granulated chloride has been applied dry. A greater amount of chloride can be applied per unit of surface at the same cost by the dry than the wet method; and a considerable amount of chloride per square yard is the desideratum, because the stronger the chloride the greater its power of absorbing water from the atmosphere.

There are certain roads in Eastern Massachusetts that do not come strictly in any of the three classes described—bituminous macadam, surface bitumen application or dust layers. Most interesting perhaps among these are the oil-sand roads laid by the Highway Commission in the sandy districts of Cape Cod. The road is first shaped with a road machine to a crown of about ¾ inch to the foot. Two coats of heavy asphaltic oil are applied at the rate of ¾ gallon per square yard, with an interval of about two weeks between. The whole surface is then cut up by a disk harrow, rolled with a light horse roller and covered with sand to absorb the free oil. An application of oil is made each year, covered with a small amount of sand and stone screenings. The first cost was about 17 cts. per square yard and the later treatment 11 cts. for each annual application. It is said that each successive year roads made in this way improve and become harder.

The Metropolitan Park Commission has laid some sections of roads with bituminous concrete, mixing the stone and bitumen by hand. For bitumen they prefer tar mixed with 10 per cent of asphaltum. This mixture was used on Revere Beach Parkway, at Eliot Circle, pea stone forming the aggregate. This work was done four years ago, and required substantially no repairs up to last year, when it was flushed over with the tar and asphalt mixture. This same bitumen has been used once every two years for six years on the Parkway along the beach in its most heavily traveled portion. The two sections look so much alike that it is hardly possible to distinguish one from the other.

ROAD WORK IN RHODE ISLAND

Plain Macadam—Tar Treatment by the Penetration and by the Mixing Methods—Methods and Costs of Construction—Results Obtained

LAST Fall the Commissioner of Public Works of Portland, Me., Mr. Bion Bradbury, Jr., obtained from Council permission to send an assistant engineer of the Department of Public Works, Mr. Edwin L. Lynch, to Rhode Island to study there the work in connection with the treatment of macadam roads with which the State Board of Public Roads of that State has been experimenting during the previous three years. During 1909 about 35 miles of bituminous macadam of various compositions were built in accordance with recommendations of Prof. A. H. Blanchard, Assistant Commissioner of Highroads of Rhode Island. Mr. Lynch reported the information gained by this visit, and this report, slightly condensed, we present herewith.

In building plain macadam the Board of Public Roads has used both local stone and trap rock. As a rule, it has used local stone, as in most localities there are enough stone walls and ledges which they can crush up very cheaply. All high roads are generally built 14 feet wide and are given a crown varying from ½ to ¾ inch per foot. Five inches of No. 3 stone are spread on the subgrade and rolled to 4 inches. On this are spread 3 inches of No. 2 stone and rolled to 2 inches. Screenings are then spread on, the whole operation differing very little from ours. Professor Blanchard said that trap was rather too hard, as sufficient dust did not work off into the voids to keep them filled. With the softer field stone and ledge he had better results.

The cost of this plain macadam averages 50 cents per square yard.

Various sections have been treated with tar by the penetration method, but while this prolongs the life of the macadam a little, it is not looked upon with favor.

Bituminous macadam seems to be the most satisfactory form of pavement yet put down in Rhode Island. Local stone is almost entirely used. The State Board builds generally a width of 14 feet, for which the State pays. Sometimes in going through towns a wider road is built and the cost is arranged differently. If a railroad track goes over the site the railroad pays for 1½ feet on each side of its rails, the State for 14 feet and the town for the remainder.

In building bituminous macadam the road is excavated to the required subgrade, which is then rolled. Five inches of No. 3 stone are spread and rolled to 4 inches. Three inches of No. 2 stone mixed with 50 per cent tar and 50 per cent asphalt, in the proportion of one and one-quarter gallons to the square yard, are then spread and rolled to 2 inches. (Experiments are now being made with 75 per cent tar and 25 per cent asphalt mixtures.) This is mixed on a spreading board, which is built in three sections, each 8 by 8 feet. The stone is spread upon the boards to the depth of 1 foot. Upon the top surface is spread about one-half the amount of tar to be used for the batch. Upon this is spread about one-half the asphalt to be used. Then the batch is turned over and the operation is repeated, using the remainder of the tar and asphalt. If the stone is not thoroughly mixed it is turned again. On some jobs the inspectors have the batch mixed with tar first and then with asphalt. This gives a better mixture, but takes about twice as many turnings and, of course, more time. As this mixture is quite sticky when hot it is allowed to set over night and is then rolled for a short time each night and morning until it has set up hard. It is never rolled in the heat of the day, as until the mixture sets it is rather sticky and hard to shape. The period of rolling and setting ranges from three to seven days, warm weather hastening the setting a great deal. The 75 per cent and 25 per cent mixture is a harder one to work, as the greater amount of tar sets up and hardens quicker.

After the No. 2 has set it is painted with either tar or asphalt in the proportion of six-tenths of a gallon to the square yard. Common barn brooms are used to paint with. Tar is easier to paint with and hardens up much quicker than the asphalt.

Immediately after painting, screenings are spread lightly over the surface, and the whole road is kept closed for three or four days longer, or until, in the judgment of the engineer, it is hard enough to travel over.

No mixing is done in wet weather and no wet rock is used. At Bristol a brisk shower of one-half hour's duration was enough to stop mixing and painting, and work was not resumed in these branches until the following morning.

In about six weeks the screenings will wear and blow off, leaving an elastic, smooth and firm surface. The heat gradually draws the asphalt to the surface, forming a protecting coat to the No. 2 stone underneath. It is this protecting coat which renders it so difficult for fast moving autos to ravel the No. 2.

The different surfaces, some painted with tar and some with asphalt, have not been thoroughly tried out yet, so it is difficult to pick out the best one. The tar coat leaves a dark, hard surface, which is dustless and is not picked up by horse-drawn vehicles. In winter, however, it becomes brittle, the edges break off and it is said to be slightly slippery. The asphalt coat leaves a black, dustless and elastic surface that is not slippery in winter. It gives a good footing for horses and is self-healing. It has the disadvantage of picking up a little under wagon wheels on very warm days.

In some cases the surface, for experimental purposes, has been left unpainted with either tar or asphalt. This leaves a surface that is ideal for horse-drawn vehicles, as it is hard and gritty. With this surface there is no protection for the No. 2, and while the bituminous compound will bond it together and it will last for a longer time than the plain macadam, yet it will ravel much quicker than the painted surfaces.

The best combination, and the one that Prof. Blanchard prefers, seems to be a mixture of fifty per cent tar and fifty per cent asphalt painted with asphalt. This seems to me to be the best type of construction for our streets.

In doing the mixing and painting, a mixing gang consists of six shovelers, one kettleman and one rakeman. The painting gang consists of two broom men and one man who keeps the pails full of tar or asphalt as the case may be.

While the cost items differ slightly on the various jobs, the following are the general ones:

Plain macadam, 50 cents per square yard; bituminous macadam, 70 to 72 cents per square yard; unpainted bituminous macadam, 62 to 63 cents per square yard; Providence gas house tar, $2.50 per barrel; Texas J. asphalt, $20.00 per ton (about 6 barrels per ton); cord wood, $4.50 per cord; inspectors, $75.00 per month plus expenses; kettleman, $2.00 per 10-hour day; other laborers, $1.50; single team and driver, $2.50 to $3.00; double team and driver, $3.50 to $4.00.

All this work is done under contract and under the most rigid inspection.

A section in East Providence built in 1908 looks very good. The automobile travel is very heavy, as it is part of the route between Providence and Newport. The surface is black, elastic and yet tough. This section was painted with asphalt and looks not unlike bitulithic. An auto passing at about fifty miles per hour raised absolutely no dust. I saw here a place which had been opened for a water trench and afterward patched, but could not have found the patch if attenton had not been called to it.

A section adjoining this on Pawtucket and Warren avenues is now under construction. It is about 18 feet wide and has a ¾-inch crown with flat quarters. There is an electric car track on each side of the road, and a strip 1½ feet wide on each side between the macadam and the nearest rail is being laid with granite blocks, which will be grouted later. As the rails are only four-inch the blocks have to be laid on the side.

This section is being laid with local stone mixed with seventy-five per cent tar and twenty-five per cent asphalt, in the

proportion of one and one-fourth gallons to the square yard. It is being painted with tar. Cost is about twenty cents in excess of the cost of plain macadam.

In Warren, a section about 21 feet wide between gutters is being built. A car track lies in the center of the road for the greater part of the way. The macadam is being built between the cobble gutter on the outside and up to the rail on the inside. It is also being laid between the rails. The building up to the rails is not a success, as the edges of the macadam have started to break off, owing to the cross traffic and the jar of the cars. In the section between the rails I noticed a series of depressions which were starting. This was explained by the fact that, owing to the presence of the ties, the surface could not be rolled to advantage and it is expected that the macadam will settle between the ties and leave a series of ridges.

About three hundred square yards are being laid per day. It is of the same proportion and is costing about the same as that in East Providence. It has ¾-inch crown.

Of various sections between Providence and Narragansett, some had been built in 1900 and some in the present year. All of it was in excellent condition, and the contrast between the bituminous macadam and the plain macadam, as regards dust and signs of wear, was very marked.

At North Kingston are three sections built this year which were opened to travel at different times. One was opened about June 1st, and on September 2d the surface had about reached its final stage and looked almost like the sections which had been traveled over six months or more. On a section which had been opened about a month the asphalt had just begun to work up to the surface and to form its coat. A section a week old showed the screenings about one-half worn and blown off.

I saw two sections which had been treated with tarvia, one by the mixing and the other by the penetration method. In the mixing method No. 2 stone was mixed with tarvia, about the same as tar, and was rolled but not painted. It gives a surface that is lighter than tar and seems to bind well. However, as there is no protection for the No. 2 other than its own bonding power, it seems only reasonable to assume that it will eventually fail under heavy auto travel. The other section was treated by the penetration method about two years ago and started to pick up under the autos this spring. It was then given a coat of tarvia A., and upon this was given a coat of tarvia B., both of these by the penetration method. On top of these was sprinkled Texas road oil. When we rode over it, it presented a compact surface which was reasonably smooth and gave out no dust. This work was not done by the State.

During the present year the Board has treated a good many miles with oil. Texas road oil is sprinkled on the old surface with ordinary watering carts, about one-fifth to one-fourth of a gallon to the square yard being the proportion. The oil costs three and one-fourth cents per gallon, and one application lasts about six weeks. The oil lays the dust but does not preserve the road. The roads are rutted badly in a good many localities, showing wear, and yet an auto at forty miles per hour raises absolutely no dust. The Board intends to let the oiled sections wear down for a year or so, then to scarify, shape them up and treat them with three inches of the No. 2 mixture painted. The odor at first is very pronounced, but after a short time is not noticed.

OHIO STATE ROAD MAPS

State Highway Commissioner James C. Wonders is having maps of the roads of Ohio printed and bound in flexible bindings, with the idea of selling them to automobile owners and others throughout the State at $1.00 each. Five thousand copies are being printed and most of these will be in art linen binding, one side of the cover being six inches longer than the other, so as to protect the edges of the maps when they are rolled up for carrying. The maps will show the kind of improvement on each road as well as the location of all roads.

BITUMINOUS TREATMENT IN PENNSYLVANIA

Mr. R. D. Beman, Deputy Highway Commissioner of Pennsylvania, in a paper before the American Road Makers Association, stated that the highway department of that State has been progressing slowly because the funds for experimental purposes were limited and they wished to avoid mistakes as far as possible; but so far they have been pleased with their experiences with asphaltic macadam. He believes, however, that surface treatment of a finished macadam road is to a great extent a waste of money, but is justifiable where a road has already been built and it is desired to prolong its life and improve its condition. He has not found any surface treatment which is beneficial for more than one year. He said:

We have come to the belief that bituminous material should be incorporated among the stones during construction. On some of our roads of this character we have used the penetration method, the asphalt being poured or sprinkled into the stone after the latter had been spread and lightly rolled to give it a uniform surface. Our efforts to obtain satisfactory results without heating the bituminous binder have been entirely unsuccessful. We have tried asphaltic oils containing 60 to 70 per cent of asphalt and found it very difficult to get the mass to bond, this being accomplished only by rolling an excessive quantity of screenings into the surface. On the other hand the roads in which we have used an asphaltic oil containing 85 to 95 per cent of asphalt, heating it before application, have given us good results. We have had better success in laying asphaltic macadam when the asphalt and stone had been mixed before laying than by the penetration method of applying the asphalt, and I am inclined to the belief that the future will bring us to the construction of only two classes of roads, asphaltic macadam of the type described last, and brick. For general rural purposes our farmers do not take kindly to brick because of its lack of resiliency and the injury suffered by horses which are driven over it. The asphaltic macadam on the contrary is more resilient than water-bound macadam, and more nearly approaches the delightful quality of a dirt or gravel road when it is in first class condition. Tar also has been the medium of some experiments, but has failed to give us the satisfaction thus far obtained by the use of asphalt; largely, I think, because of its lack of uniform quality.

BITUMINOUS MACADAM IN NEW JERSEY

The Commissioner of Public Works of New Jersey, Frederick Gilkyson, in his report for the year 1909, states that the County Boards and Engineers of the State are unanimous in favor of constructing bituminous macadam roads in place of plain macadam. A number of such roads had been built in 1908, and an inspection of these made in the spring of 1909 appeared to offer convincing argument that bituminous macadam roads would better meet the requirements of travel than plain macadam; and while the first cost of construction would be slightly in advance of an ordinary macadam road, the reduction in the cost of repairs and maintenance would result in considerable saving. As a result of this conclusion 70 miles of bituminous macadam roads were built and construction on 31 additional miles was begun during the year 1909; this work unquestionably placing New Jersey as far in advance in modern road building as any State in the Union, in Commissioner Gilkyson's opinion; and the total mileage of bituminous roads is believed to be greater than that in any other State.

As an illustration of the additional cost of bituminous macadam over ordinary macadam, bids for both kinds on several roads which were received during 1909 are given in tabular form as follows:

Mixing Method

Name of Road	Ordinary Macadam Per sq. yd.	Bituminous Macadam Per sq. yd.
Walnut and Central Avenue, Union county	$0.75	$1.10
Gladstone and Chester, Morris county	.62	.95
Brown's Corner, Camden county	.90	1.17

Penetration Method.

Name of Road	Ordinary Macadam Per sq. yd.	Bituminous Macadam Per sq. yd.
Beattystown, Warren county	$0.56	$0.62
Plainsboro and Cranbury, Middlesex county	.73	.90
Jamesburg and Helmetta, Middlesex county	.73	.85

"It will be noted that the average additional cost of this type of construction is 31⅓ cents per square yard, or $2,570 per mile, for a fourteen-foot road when the material is mechanically mixed before application to the road, and 12 1/5 cents per square yard, or $1,000 per mile, for a fourteen-foot road when the bituminous material is applied by the penetration method. It is estimated that these roads will cost little or nothing for repair and maintenance during their first two years, and after that period the cost of maintenance will not exceed $250 per mile, while the average yearly cost for the proper maintenance of a macadam road is $400 per mile; therefore, the economy of the construction of a bituminous road is very apparent."

In applying asphalt by what is known as the penetration method, the surface of the road was cleaned and scarified, from 3 to 4 inches of 1½-inch stone spread over it, the roadway was then rolled to a proper cross-section, after which heavy asphaltum oil, heated to about 200 degrees F., was evenly distributed over the surface at the rate of about 1.3 gallons per square yard. After sufficient time had elapsed to allow the oil to work down into the interstices of the stones, stone screenings were spread over the road and the entire roadway again thoroughly rolled. The same method was also used employing tarvia in place of asphaltum oil. The average cost of this work is approximately 55 cents per square yard, or $4,517 per mile for a 14-foot road.

"This type of pavement resembles an asphalt street; in fact, for suburban streets and county roads it is just as desirable. While possessing most of the virtues of an asphalt street it is more resilient and less slippery; consequently, better adapted for horse travel. It is as nearly dustless as a pavement can be made and the surface is not disturbed by the action of the automobiles in passing over it."

STATE SUPERVISION OF ROADS

What State Commissions or Departments are Doing—Amount and Cost of Work—State Aid by Money or Convict Labor

THE ideas of State supervision and State aid in road construction, one or both, have now been adopted by a considerable number of States and we endeavor to present below as briefly as possible an outline of what the several States are doing in this respect; these data being from the reports or special information by the State commissioners of other officials in charge of the highway departments.

Maine spent $115,200 last year for aid in road construction. Five hundred and one applications for aid were received, and joint funds were expended in 477 towns. The most of these were for gravel roads, macadam roads being second, earth roads third and bituminous macadam showing the least expenditure. The average cost of macadam was 58.18 cents per square yard and of bituminous macadam $1.145. Gravel roads averaged $2,744.90 per mile. The State appropriation for 1910 is $321,000, of which $228,000 can be applied to aiding townships and the remaining $93,000 will be used for the construction of trunk line roads, together with $20,000 which has accumulated during the past two years through not having been used for State aid.

In New Hampshire there were constructed last year nearly 11 miles of plain macadam at an average cost of $6,100 per mile; 1¼ miles of macadam with bituminous binder at $7,800 per mile; about one-half mile of gravel road and .9 mile of earth road. The total expenditure for road construction was $243,700 and for repairs and maintenance $16,000. This year $625,000 is available for road construction and $25,000 for maintenance.

In Massachusetts 22.83 miles of ordinary macadam were built last year by the State, 9.73 miles of macadam with bituminous binder, and 2.53 miles of gravel road. In addition to these about $50,215 was appropriated for aid to towns in building about 30 miles of road. The total expenditure by the State Highway Commission was $351,700 for construction and $402,000 for repairs and maintenance. The amount available this year is $500,000 for construction, and for maintenance the automobile fees, which are estimated to amount to $175,000.

In Rhode Island the Highway Commission last year constructed 122,000 linear feet of water bound macadam and 47,000 feet of macadam with bituminous binder. The total amount spent for construction was $315,234 and for maintenance $46,030. The appropriations for 1910 are $300,000 for construction and $55,000 for maintenance.

The Highway Commission of Connecticut last year constructed 283,614 feet of macadam roads, 154,138 feet of gravel roads and 85,124 of earth roads. The total amount expended for construction was $766,512 and for repairs $44,674. Money has been appropriated for experimental roads but has not been used and will not be until something definite has been worked out by other investigators.

The New York Highway Commission states that there are in that State 79,632 miles of public highways, of which 1,987 have been macadamized and improved by State aid as first class macadam roads. In addition, 2,318 miles have been macadamized by town officials, 8,177 were town highways surfaced with gravel, 53,621 are town highways shaped and crowned, and the remainder are practically unimproved. During 1909 the amount expended by the highway department in State aid was $2,846,263; and for maintenance of State aid roads $925,167, and for aid of towns in maintaining earth roads $1,441,751. The entire expenditure for all road purposes throughout the State by either State, county or town during 1909 was $9,880,565.93. The total value of tools, machinery and implements employed by the various towns is over $900,000.

In New Jersey under the supervision of the Commissioner of Public Roads there were constructed last year 27.7 miles of plain macadam, 29.8 miles of macadam with bituminous binder and 38.4 miles of gravel roads. The total expenditure during the year was $820,549.47 for road construction and $1,039,822.71 for repairs and maintenance. The State aid allowed is one-third of the total cost.

The State Highway Commissioner of Pennsylvania constructed 833,584 feet of plain macadam, 7,237 of macadam with bitulithic binder and 25,666 feet of brick road. The total expenditure for construction during the year was $1,649,033.57 and for repairs and maintenance $214,391.71. The appropriation for 1910 is $900,000 for construction and $1,001,000 for maintenance.

In Delaware the State Highway Commissioner constructed 7,960 feet of plain macadam, 1,912 feet of macadam with bitulithic binder and 7,000 feet of Amiesite. The total amount spent, including uncompleted contracts, was $113,325.96. The amount available for construction and maintenance this year is $249,000.

The Maryland State Road Commission constructed last year 160,776 feet of plain macadam, 3,960 feet of macadam with bitulithic binder, 8,917 feet of gravel road, one mile of sand-clay road and 26,597 feet of oyster shell road. There is available for construction this year $400,000.

The State Highway Commissioner of Virginia provided State aid for macadam road construction in eleven counties amounting to 54.37 miles. Three counties have constructed or are constructing 16½ miles of gravel roads with State aid: seven counties are constructing 38.93 miles of sand-clay roads with State aid. A number of counties have built roads of each of these kinds by the use of convict labor.

West Virginia has just started a State Road Commission and an appropriation of $125,000 is available for this year. In North Carolina there is no State commission. The largest mileage of improved roads last year was of sand-clay roads, the average cost of which was $552 a mile. In South Carolina an effort is now being made to establish a State highway department. In this State also the majority of improved roads are sand-clay, there being 1,273 miles of these as against 73 miles of macadam and gravel.

In Georgia State aid consists in furnishing convicts for work upon the public highways. Nearly 5,000 of these are now at work in over 100 counties.

In Florida, Alabama, Mississippi, Louisiana and Texas there are no State highway commissions or departments or any direct State control over the highways.

In Ohio the State Highway Commission constructed, during 1909, 105,555 feet of plain macadam, 34,162 feet of macadam with bituminous binder and 107,976 feet of brick road. In Indiana there is no State highway department. In Illinois State aid is confined to furnishing crushed stone prepared by convict labor at the penitentiary, engineering and supervision. In Kentucky a constitutional amendment and bills for making it effective will probably go into effect this year, creating a State high way department. In Tennessee the Legislature last year created a highway commission, whose duties are at present confined to collecting data and recommending legislation in 1911. In neither North nor South Dakota, Michigan, Minnesota, Wisconsin, Iowa, Nebraska, Kansas, Arkansas, Idaho, Montana, Wyoming, Nevada nor Oregon is there any commission or official which has any control over the highways of the State. Missouri exercises some supervision over the State roads but gives no aid.

The territorial Legislature of Arizona last year appropriated $200,000 for roads and bridges, which will be available for work this year.

The State of Washington spent $640,000 for State roads in various sections and it is planned to spend $900,000 this year and in following years on a regular system of State highways. The Utah State Road Commission has as yet done no construction but has available for 1910 the sum of $27,000. California has jurisdiction over certain roads only as State roads, totaling about 176 miles; and has under construction about 90 miles more. The State has simply graded and aligned the roads, leaving it to local authorities or future appropriations to further improve the same. A road commission was created in New Mexico in 1909 and work begun on a few State roads. Such as are being improved are being given a sand-clay surface.

DUST LAYING IN NEW BEDFORD

Eighty Percent of Macadam Streets Treated—Best Results When Streets Previously Cleaned—Detailed Cost of Treatment

By WILLIAM F. WILLIAMS, City Engineer of New Bedford

DURING the year 1909 the city of New Bedford, Mass., spent $13,515.70 on dust-laying preparations. It was a popular expenditure of money, although there was some complaint from owners of bicycles that the oil caused a rapid deterioration of the rubber tires to their wheels, but the owners of automobiles made no such complaints. The press recorded a few complaints of injury to carpets, but the general opinion was one of approval and the city was unable to comply with all the requests for oil. No charge was made to owners of property on the streets treated, the entire cost being paid out of the general tax levy.

The city has 74 miles of macadam streets, with an area of 940,440 square yards. Dust layers were applied only to macadam streets, and about four-fifths of these streets were treated.

The native rock of this section is granite, and it is used exclusively in the building of our macadam roads. Owing to the great variation in composition of the local granite it is easily pulverized under traffic, and creates such a large amount of fine dust that it has become a serious nuisance to the public.

The city, in trying to remedy this trouble, has so far confined its efforts entirely to the use of "dust layers," and has not as yet experimented in the direction of "dust prevention" by using for the construction of macadam roads a more homogeneous and harder stone, together with some form of an elastic binder.

Details of the dust layers used are given in the accompanying table. The applications were made each month from April to October, inclusive.

Dustoline and Standard Road Oil were applied with a sprinkling cart fitted with the regular water equipment. The asphalt oil was applied with the same carts, using a special sprinkler furnished by the Standard Company.

The streets were *not* thoroughly scraped and swept immediately before applying the oil. Some streets had a considerable amount of fine material upon their surface when the oil was applied. Dustoline was absorbed quite rapidly, especially if the the streets were dry. The Standard Road oil was not absorbed so quickly, and the asphalt oil worked into the surface of the street very slowly. The latter was in part due to the low temperature which prevailed at the time it was applied, which was in April.

This spring the streets having a considerable traffic showed very little evidence of the dust layers applied last year, except in the larger accumulation of dirt and dust on the surface. Whether the actual wear had been greater or less than it would have been without the use of oil is difficult to say.

It is my opinion that all fine, loose material should be removed from the surface of the street before applying any dust layer. It is true that in dry weather this loose material on recently oiled streets, with a large automobile traffic, irons out smooth and quite firm, but when it rains it soon becomes soft mud. In a short time the oil is either overloaded with dirt or loses its cohesive properties through evaporation and the material is ground into a fine dust easily moved by the wind.

The suburban streets and the streets of light traffic still showed the effects this spring of the "dust layer" applied last summer. This was due, in part at least, to the fact that these streets were cleaner when the material was applied.

The city expects to spend about the same amount on "dust layers" this year as in 1909, but hopes to cover a greater mileage and to secure even better results. The streets are being cleaned before the applications. Also a more careful record is kept of the yardage of surface covered and the amount of material used.

We are using this year Dustoline and the Standard road oil, light and regular.

At this stage in our experience with "dust layers" it would be unwise to express a conclusion as to the relative merits of the materials used. Manufacturers of these compounds are honestly endeavoring to meet the situation. But it can readily be understood that the conditions to be met may have a wide variation.

DUST LAYERS USED IN NEW BEDFORD, MASS., IN 1909.

	Gallons Used	Material Used Per Square Yard for One Coat, Gallons	Miles of Road Treated			Area of Same Square Yards			Total Area in Sq. Yds.	Cost		
			1st Coat	2nd Coat	3rd Coat	1st Coat	2nd Coat	3rd Coat		Material	Application	1 Coat per Sq. Yd.
Dustoline	145,381	0.124	52.3	29.2	13.0	646,550	359,671	160,323	1,166,544	$11,005.23	$566.88	$0.00938
Heavy Asphalt Oil	6,425	0.386	1.35	.....	.....	16,632	.....	.....	16,632	257.00	34.93	0.0175
Standard Road Oil	30,686	0.142	8.5	7.7	1.1	105,606	95,503	14,233	215,342	1,534.30	117.36	0.00807
Total	182,492	.....	62.15	36.9	14.1	768,788	455,174	174,556	1,398,518	$12,796.53	$719.17	.....

TAR MACADAM IN POUGHKEEPSIE

Interstices of Stone Filled with Sand, and Surface Covered with Trap Rock Screenings—Condition Good After One Year's Use.

By ROBERT J. HARDING, Supt. of Public Works, Poughkeepsie

IN the summer of 1909 Hooker avenue, Poughkeepsie, N. Y., was surfaced with macadam with a bituminous binder. Working on the theory that trap rock crushed to the size known as No. 2, or that which passes a 2⅜-inch and is rejected on a 1⅛-inch screen, and placed of sufficient thickness, rolled and held firmly in place, would give a surface suitable to the usual city traffic, the city, through its highway department, experimented in the construction of about 13,100 square yards of tar macadam at a cost of 86 cents per square yard. The work was done entirely by day labor. The trap rock, sand, screened screenings and tar cost, delivered, $1.72, $1, $2.50 and 8 cents, respectively. The great variance in the cost of No. 2 stone and the screenings was due to the fact that the latter had to be brought by rail. Laborers were paid $1.75 for 8 hours.

The total thickness of rolled trap rock was 6 inches, and the road averaged 2.3 gallons of tar per square yard. The single track trolley line in the center of the street received only 4 inches of trap rock. The railway track in its construction consisted of a 4¼-inch tee rail on very small ties, with practically no ballast.

The work consisted in excavating a partially macadamized road to a depth of six to eight inches and substituting two courses of No. 2 trap rock, so that a rolled depth of six inches of stone was obtained. The interstices in the stone were filled with dried Cow Bay sand to within about ¾ inch of the surface and then covered with tarvia A, applied from large cans similar to sprinkling cans. After the hot tarvia A was applied the surface was thoroughly covered with screened ½-inch trap rock screenings, no dust remaining in the screenings. The surface was then rolled and an application of tarvia X applied followed by a second covering of the trap rock screenings and rolled again, which completed the road.

FIG. 2—APPLYING TAR AND ROLLING

It was designed to have no thickness of tar and screenings upon the surface, only sufficient to fill the spaces between the larger stone, the idea being to bring the traffic upon the larger stone as soon as possible.

The difficulties met with in construction consisted in thoroughly filling the road with the dry sand. It was found necessary to spread the sand on the surface and allow it to remain long enough for the sun to thoroughly dry it, when it was broomed and rolled and thus jarred down. It was found that the tar would penetrate only about ½ inch in the dry sand, so that if the sand came too near the surface the first coating of tar would roll up and separate from the stone; and on the other hand, if insufficient sand was applied, the first coat of tar would go too far below the surface and be, at first thought, wasted. But I am of the opinion that there is very little danger of getting too much tar down into the road, but that it is much better to get the stones in the body of the road for at least 1½ inches from the surface thoroughly coated with tar; and in order to accomplish this the filling sand ought not to be brought within less than ¾ inch of the surface, thereby allowing the sand to settle about ¼ inch due to the application of the tar, and ½ inch for penetration, leaving the spaces in the upper one

FIG. 1—OUTFIT AND GANG AT WORK ON HOOKER AVENUE

FIG. 3—FINISHED ROAD AFTER ONE YEAR'S WEAR

inch to be filled with the fine trap rock. The second application of tar fills the remaining space and second application of fine trap rock insures it.

Figures 1 and 2 show the road under construction. Figure 3 shows the finished surface after one year's traffic in places where the sand filler only came within an inch of the surface, showing the No. 2 stones in the surface; and Figure 4 shows the road when the sand filler came nearer to the surface, allowing a surplus of tar on the surface.

The winter just passed was unusual in that there was a covering of ice and snow on the road during the whole winter season, and as a result the winter traffic was not as severe as usual on road surfaces. The road to-day is in perfect condition; there is not a single place where the surface has broken up nor is there any indication of raveling. The road is elastic, has been swept daily and is in constant use and is especially selected by automobilists. The presence of the street car track concentrates the traffic on each side within narrow limits and makes a severe test. During the winter the portion between the rails just next to them had a tendency to curl up, owing to the flange on the car wheel cutting in with the movement of the rail, but with the warm weather this entirely healed up of its own accord. A slight wavy effect still exists where the ties move up and down, but no breaking up as might be the case with asphalt.

FIG. 4—FINISHED ROAD AFTER ONE YEAR'S WEAR

No treatment or repairs to the road will be necessary this year. Very likely in another year a superficial coating of tar with screenings may be necessary in places. However, all the qualities of a first-class pavement are being enjoyed, and if there should develop a small annual outlay it would be at least years before the total cost per square yard would amount to prices being paid for the standard pavements.

JEFFERSON AVENUE IMPROVEMENT

Making an Asphaltic Concrete Road of an Impassable Sand One—Foundation of Macadam and Cinders —A "State Aid" Road

By FRANK J. HUBBARD
County Engineer of Union County, N. J.

JEFFERSON Avenue is the dividing line between the City of Plainfield, Union County, and the Borough of Dunellen, Middlesex County, New Jersey, and hence is the county as well as a municipal boundary line. Lying thus on the edge of these several forms of jurisdiction it seemed to be the business of no one in particular to keep the street in order and the result was most deplorable.

This street extended from West Front street, the main line of travel between Plainfield and Somerville, northwesterly about two-fifths of a mile to Green Brook where was located a brickyard which was largely responsible for the almost impassable condition of this street twelve months in the year.

The soil throughout this section is a fine, powdery sand underlaid by clay and furnishing ideal quicksand conditions in wet weather; this in addition to the heavy loads from the brickyard made the roadway a series of deep tracks and high ridges, with the worst of the sink holes filled in with brickbats which had been driven in by the travel in spots and heaved up by the frost in others, until the road was past description in its appearance and so entirely past the stage of travel that the steering gear of at least one automobile was wrecked among its canyons.

The two counties finally adopted this street as a "State Aid Road," and began work on its improvement in the summer of 1909.

The first move, of course, was to bring the surface to a uniform grade; this necessitated considerable fill at the lower end and the brickbats in the old road were utilized to good advantage as a foundation for the new construction. Then for about 1000 feet we found the sand particularly fine and "floury," the particles round instead of sharp, more like clean dust than sand and of such a nature that it could not be rolled, and it seemed impossible to obtain a foundation for our work. So an extra excavation 6 inches in depth and the full 16 feet in width of macadam was made and filled in with slag and cinders from a near-by foundry. Drains were laid from this sub-foundation to the gutters to care for future accumulations of water and the result was a foundation second to none for a macadam road.

After thoroughly rolling and compacting this foundation, the first course of macadam, consisting of 2½-inch crushed trap rock, was spread for a depth of 5 inches and thoroughly rolled with a 10-ton steam roller. The binder used on this course was coarse sand in sufficient quantity to fill the voids of the stone but not to cover it. Any excess of binder on top of this course was carefully swept off before applying the second course, so as to insure a perfect bond between the two.

The second course was composed of Amiesite, which is a mechanical mixture of stone and hot asphaltum fluxed with a lighter oil, the oil being fixed by the addition of slaked lime. This mixture is prepared at the quarry and the coated stone shipped by rail to the nearest station to the road, from whence it is hauled to the road, cold, in wagons, dumped and spread. It is remarkable with what ease this sticky, coated stone is handled and spread, once the men are used to it and mix a little brain with their muscle.

JEFFERSON AVENUE, LOOKING NORTH, BEFORE IMPROVEMENT

The initial uniform spread of this material is an exceedingly important factor in obtaining the ideal road for, after it is thoroughly rolled, it seems almost impossible to so fill in the depressions or cut off the knolls as to make a true surface.

When the material was spread for two or three hundred feet, for a depth of 4 inches, it was immediately rolled with a 10-ton steam roller and the depressions filled after the roller had passed over once—the successive rollings driving this fresh material into that first spread and finally compacting it to such an extent that the roller made no further impression. It was then coated with trap rock screenings treated with this same asphalt mixture and this finer material filled all the surface voids, leaving an absolutely watertight road, so hard that the heavy hauling has made not the slightest impression or appearance of rut after six or seven months of wear, and yet of such a peculiarly elastic surface that horses find on it an exceptionally good footing, while for automobile travel it fulfills every condition, being dustless and so thoroughly bonded that the suction of the wheels cannot pick it up.

The fact that this form of pavement is ready for travel the moment it is rolled, without closing the street for days or weeks waiting for the binder to set, is a very great advantage in these days of bituminous binders.

As constructed the macadam is sixteen feet in width and seven inches in finished thickness, with about a third of its length having the additional 6 inches of slag sub-foundation above described. The grades have been reduced from 1.10 per cent to 0.58 per cent, one advantage of which is saving the wash of gutters in the light material encountered. From an almost impassable stretch of brick-bat-filled quagmire and sand wastes it has been transformed into an avenue which gives pleasure to everyone having occasion to pass over it, and which shows, in the estimation of the State Commissioner of Public Roads, probably a more striking contrast between the former and present condition of the surface than in the case of any other road improved in 1909.

The accompanying cuts illustrate its condition before and after improvement.

JEFFERSON AVENUE, LOOKING SOUTH, AFTER IMPROVEMENT

SAND-CLAY ROADS

How to Make Good Country Roads on Sand or Clay Soil—Instructions of Department of Agriculture—Cost of Work in Kansas

ONE of the most difficult problems in road construction is that where the small amount of traffic does not warrant any great expense and yet where the unimproved roads are so poor as to be almost impassable during a greater or less part of the year. The office of Public Roads of the U. S. Department of Agriculture has been doing excellent work in investigating these conditions and in advertising widely such remedies as seem to it most feasible and effective. Where the natural soil is either clay or sand, the former of which is almost impassable in wet weather and the latter in dry, it recommends sand-clay surfacing.

In Circular No. 91, issued a few weeks ago, from which circular the following is abstracted, it describes work done by it in constructing such roads in the middle west. Here it found the most difficulty in counties where the soil is either that locally known as gumbo, buckshot or blackwax, or the loose shifting sands of the sand hills.

CLAY ROADS

Gumbo has the characteristics of readily absorbing water and becoming very sticky when wet, but drying out quickly when the sun shines. It is composed chiefly of aluminum silicate, with a little iron, and usually carries a considerable quantity of organic matter. When dry it breaks up into cubes or granulates, whence comes the name "buckshot" often applied to it. In making a road on such soil the sharpest and coarsest sand obtainable at reasonable expense should be procured. If a coarse sand is not available any clean sand may be used. It is often a matter of using, not what one judges best, but such as can be had within the means of the supervisor. *Any sand will improve a clay road.* The sand is to be mixed with the road after the latter has been wet by rains, but it is a good plan to haul it in advance while the road is still dry and dump it in piles along the sides of the road. When the road is softened by rain a quantity of sand should be spread broadcast over the traveled roadway for the desired width—about 14 to 18 feet—until the softened clay surface of the road is saturated with sand. In this way the advantages of hauling the sand on a firm, dry clay road are obtained and it is ready for use when the road has been softened by rain and slightly cut by travel. If the road is treated before it is too deeply cut by travel less sand will be required to give it a hard surface than would be the case were this delayed until deeply cut and full of mud holes. No ultimate harm would come from allowing it to become deep mud, but an unnecessarily large quantity of sand would be required to effect a remedy and there would entail needless expense for surface material. For the first application of sand from 5 to 8 inches would be sufficient to give a hard surface to almost any well-drained road, however plastic it may be. If, however, the surface is deeply cut, it may require twice as much sand to form a good road. But however deep the mud hole may be, sand can fill it and make it permanently firm for travel.

An excellent state of preparation can be had by driving a herd of cattle over the road when wet and at the same time adding the sand. By this simple method a thorough mixture of the surface sand and clay is formed, and, as it dries somewhat, a split-log drag may be used to produce the crown and maintain it until the road is hard and smooth under travel. Should any place in the road fail and become muddy, more sand must be added each time such a failure is noticed. In the absence of a herd of cattle (or of sheep) an excellent surface condition preparatory for the sand can be obtained by using a disk or tooth harrow to loosen the surface of the clay.

The depth of the sand-clay mixture must be in proportion to the burden of travel. If the road is to withstand very heavy

travel and extreme weather conditions, a deep sand-clay composition will be necessary, and there should be only clay enough in the composition to fill the voids in the sand and act as a binder.

Where sand is not available locally it may be transported by rail, delivered in chutes, loaded therefrom by gravity into wagons, and hauled to the roadside for less cost than macadam, and in most cases it will prove equal, if not superior, to the more expensive macadam road. But no half-hearted effort should be attempted. A steam shovel should be used to load cars of the ballast type, and they should be unloaded into chutes by gravity at the desired station. The sand may then be dropped into dump wagons, hauled to the place of use, and dropped in sufficient quantity in regular order along the road to be improved.

Sand Roads

In improving sandy roads the aim is to obtain much the same kind of surface by adding clay to the sand. The conditions are different, however, as the sand furnishes a perfect underdrainage and yet its capillarity supplies the right amount of moisture to maintain the bond in the clay and prevent its becoming thoroughly dry, in which condition it would crumble to dust and be dissipated by the wind or into the deep sand. In preparing such a road, Mr. W. L. Spoon, Superintendent of Road Construction, who prepared this description, recommends the following procedure.

The center of the road is laid out by stakes (plaster laths serving the purpose excellently), and with a turning plow a furrow is thrown up from each side toward the stakes, making a ridge exactly in the center of the road. Then by back-furrowing to this ridge a roadbed is thrown up to the width which is to be clayed, ordinarily about 14 feet. A drag or harrow is used to smooth this bed and a crown is made to conform to the proposed finished road. After this the shoulders are back-furrowed on both sides of the roadway with the turning plow, the plow being set so that it will discharge the material in a ridge just outside of the last furrow made in forming the bed. By several rounds with the plow the shoulder is raised sufficiently to form a protection to the sides of the clay when placed in the bed thus prepared. Usually five of these furrows on either side complete a 30-foot road to the ditch line.

After being thus prepared the clay is hauled on, the first six or eight loads being dropped exactly in line with the center stakes. The next loads are dropped on one side of the center loads, inside of the shoulder, but only about one-half as many should be dropped on the side as were dropped in the center. Clay should then be dropped on the other side in the same manner. This work should be done in such a way that the center line is some 50 feet in advance of one side line and the first side line about the same distance in advance of the other—an arrangement by which three loads can be unloaded at once. With this plan the teams will not be blocked in hauling and, furthermore, by keeping the center line well in advance of the sides it is an easy matter to keep the road true and even.

After 200 linear yards of road have been covered, the clay should be spread. It is important not to begin to spread the material immediately after being dropped from the load. Nothing is better for the purpose of spreading the clay than a two-horse, two-wheel grader. The spreading is begun by pushing the side loads toward the center to fill in the space between the center and the side loads, which has already been rolled by the wheels of the loaded wagons. (The side loads should be pulled toward the center first, since it is easier to cut down the crown later, if too high, than to build it up.) After this has been done the hauling should be continued until the material has been thoroughly packed by the wheels of the loaded wagons passing over it. The center may then be brought toward the sides with the grader, if necessary, and the entire road smoothed, and travel may then be freely allowed on any part of the road. The clay should be so dropped and spread as to secure the desired depth, which should not be less than 6 inches, and may be as much as 12 inches when very heavy loads are to pass over it. Last of all the surface is finished with the grader. The securing of a smooth surface is especially desirable, for if there are any small depressions these are sure to increase by travel. If by neglect or other cause the clay has been dropped improperly, causing a thin place, the necessary addition should be made at once and all the material should receive the same rolling and construction.

After the clay has been thus placed and graded the construction is identically the same as that described before for gumbo or clay; with the exception that the sand, in the case of the sandy road, will not have to enter as deeply into the clay or form as large a percentage in the composition, except for the upper inch or two of the surface. After the road has been properly smoothed the grader may be reversed and used to bring a covering of sand onto the clay from the sides of the road where it had been previously deposited in making the shoulders. If the clay surface has formed considerable dust sufficient sand, fully twice as much as the amount of dust, should be added and thoroughly mixed by means of a tooth harrow. When the rains come, only mucking and settling remain to complete the composition. The clay should never be permitted to be rutted through to the sand base, for if this occurs and it should be continuously dry for a long time the loose sand would work up from below and cause sandy pockets in the road, not unlike mud holes in a clay road in effect.

After the clay has been placed upon the road, sanded, and treated as above described, the turning plow should again be used to build up the sandy shoulders until nearly level with the clayed part. In this way a trap will be set for all the clay that blows or washes to the sides. These shoulders also conserve moisture. This last suggestion applies to deep sand only and never to shallow sand where the rain is not at once absorbed.

Coarse sand is better than fine, where there is any choice, since it is less liable to be blown away and less disposed to break up the clay bond. Vegetation of some kind should be encouraged to grow on the sandy berm to protect this from wind erosion. If much rain should come and the clay should soften, as much sand should be added as the softened clay will mix with well, and the sanding should be followed with a drag until the road is again dry and firm.

The maintenance of the road is of the utmost importance especially for one or two years after construction. Proper care at the right time often saves a whole road from failure. There is nothing permanent about a road except its location, and even this is often in jeopardy.

As to the clay to be used, the binding power is one of the properties to be sought for most carefully. If the material packs readily and pulverizes slowly when dry or softens slowly when wet, it may be safely accepted for a suitable material for making a sand road hard. This characteristic alone can be relied upon. Color has little or no significance as to its value.

If the clay is a gumbo or similar material which cracks in every direction when dried out, it is necessary to add more sand after each rain and also when the material cracks in this way, and these cracks should be filled with sand as often as they appear, this being continued until sufficient sand is incorporated to stop the cracking completely. During an extended drought this cracking may cause the entire disintegration of the road; consequently every rain should be utilized to the fullest extent in securing a mixture of sufficient sand with the clay to prevent such cracking. A clay road which is sticky in wet weather should be treated with more sand until this condition disappears. The final mixing of the clay and sand must be done when these are wet, as otherwise there can be no bond. It is also of the utmost importance to use the drag frequently on the road during the first year.

Four roads in Kansas built by hauling clay and building the road as described above gave prices varying from 40 to 58 cents per cubic yard of clay, the average being 51½ cents; and from 10 to 17 cents per square yard of sand-clay surface, the average being 14 cents. The clay in these cases varied from 9 to 13 inches deep, averaging 11¼ inches.

BITUMINOUS MACADAM IN KNOXVILLE

Two Courses of Macadam, the Upper with Bituminous Binder —Asphalt Binder More Durable than Tar but Harder to Apply

By S. D. NEWTON, Assoc. M. Am. Soc. C. E.

DURING the summer of 1909 there was laid in the City of Knoxville, Tenn., of which I was at that time City Engineer, a short experimental section of tar-macadam pavement. The pavement was designed by me to be laid on cross streets in districts paved on the abutting property plan where, on account of the cost and greater frontages, it was impossible to get the abutting owners to petition for more expensive work. Knoxville is built in the hills, street grades are usually steep, and we are greatly troubled by mud, gravel and trash washed down onto the paved thoroughfares from unimproved or illy improved intersecting streets. I hoped to interest property owners in some form of construction which, while very much cheaper in first cost, would be abundantly satisfactory as a dust and mud preventive on streets of light travel.

The section of street on which the experiment was tried (Armstrong avenue) is 486 feet long, 43 feet wide and contains, including the intersection at the end, 2,334 square yards of surface. The street is on about a 2 per cent grade and the finished surface shows a 12-inch crown. It is strictly of a residence character and, being closed at the far end, it carries only very light travel, the heaviest load coming upon it being an occasional coal wagon. The natural base was excellent, a 10-ton roller causing, except in a few soft spots, very little settlement indeed.

My specification was designed to satisfy the requirements in another street where the abutting owners had petitioned for macadam 11 inches thick at the gutter lines and 14 at the crown. A technicality prevented this latter street from being paved. A thickness of about one-half this amount would probably have been abundant on the street where the experiment was tried. The first course, built of crushed flinty limestone rock from 2 to 3 inches in diameter, bound together with screenings of one inch and less in size, was specified to be 8 inches thick and to be compacted wet in the usual way. After this course had been thoroughly dried, a second course of the same material, screened to sizes ranging between one and two inches in diameter and knitted together with material of one-half inch and less in size, was to be placed thereon, laid cold and dry and thoroughly rolled. This second course was then to be treated with an application of coal tar at a temperature of from 250 to 300 degrees Fahrenheit, spread evenly in the quantity of 1½ to 2½ gallons per square yard of street surface, the whole covered with a layer of ½-inch screenings and thoroughly compacted by a 10-ton roller.

The tar to be used was specified to have a specific gravity of from 1.17 to 1.20, was not to contain water or ammoniacal liquors, was not to boil at a temperature of less than 230 degree Fahrenheit, and, upon distillation at a temperature of 518 degrees Fahrenheit, at least 50 per cent in volume of pitch was to remain after all oils had been driven off.

As required by law, the work was let by contract, Mr. S. P. Condon, of Knoxville, being the successful bidder, at $1.10 per square yard, exclusive of grading. The work was done in an excellent manner. Barrett Manufacturing Company's Tarvia "A" being used for the mastic, in quantities approximating the maximum (2½ gallons per square yard of surface) allowed in the specification. The weather was warm and dry, and no trouble was experienced in getting the tar to adhere to the stone. A street having considerable surface resemblance to "Bitulithic" was the result.

The work is too recent for me to form any judgment as yet as to its lasting qualities, although I see no reason why, in that location, it should not have a long and useful life. A recent inspection shows the street to be in excellent condition, except that on a warm day a small amount of tar oozes to the surface.

PAVED WITH BITUMINOUS MACADAM IN 1909
Photographed May, 1910

This can very easily be taken care of, however, by the application of a few shovelsful of fine screenings. Residents on the street say that they prefer what they have to a street surface of standard construction.

Owing to financial reasons, I do not anticipate any further experiments with bituminous macadam in Knoxville this year, unless it be in some of the outlying suburbs; but if the work already done continues to hold good, future seasons should bring about a large increase in the yardage of pavements of this same general character. A lesser thickness of material, as before suggested, will very materially reduce the cost, while at the same time lessening the life of the pavement (provided there is a good foundation) very little, if any. In the light of our present knowledge, it seems likely that asphalt or residual pitch will prove in the long run to be a better mastic than any preparation of coal tar can possibly be, because of its greater chemical stability; but, to offset this in some measure, it will probably be found necessary, in order to secure thorough adhesion, to heat the aggregate as well as the asphaltic mastic and to thoroughly mix them in the kettle before depositing on the street, as is done to-day with "Bitulithic" and asphalt pavements.

I am not in possession of the contractor's cost sheets on this work, but, owing to the slowness of the crusher men in furnishing the rock and the small yardage paved, I believe that the profits were light. Laid in larger quantities and with an average thickness of, say, 8 inches, the work ought to be done in this vicinity at a good profit for 60 cents or less per square yard. Crushed rock costs about $1.50 per cubic yard delivered, and unskilled labor can be had at from $1.25 to $1.35 per day.

ROAD TREATMENT IN SPRINGFIELD

IN the report for 1909 of Mr. A. A. Adams, Superintendent of Streets and Sewers of Springfield, Mass., it is stated that during that year Pecousic Avenue was reconstructed with mixtures of tar and asphalt with trap rock. The tar was furnished by the American Tar Company, of Malden, and the asphalt by the Texas Company, of New York. Different grades of both materials were tried in varying proportions, and the materials laid in two or three different ways as an experiment. Mr. Adams was so satisfied with the result that he recommends laying more of this type of road in streets subjected to heavy auto traffic.

During the year the department experimented with four materials as dust layers, namely, calcium chloride, Headley's dust preventive, oil emulsion, and road binder. About 12 miles of streets were treated with these various materials and the superintendent "is of the opinion that, although the cost of dust laying by these means is somewhat higher than with water alone, the use of some of these materials to a considerable extent during the coming year is justified."

DUST LAYING IN ST. PAUL

Water Sprinkling by City—Organization of Department—Cost of Work—Assessed on Property Benefited—Calculation of Assessment

By C. L. ANNAN

BEGINNING with 1909, street sprinkling was conducted in St. Paul, Minn., by the Commissioner of Public Works. On March 30, 1908, the Charter Commission of the city advertised a proposed amendment permitting street sprinkling to be done by the city. This was adopted at a municipal election on May 5th, was ratified by Common Council and approved by the Mayor on May 12th. The Commissioner of Public Works was not authorized to begin work under this amendment until March 20, 1909, when he was instructed to sprinkle certain designated streets during that year; the streets selected being practically those on the schedule of two years before. About April 1st the office engineer was instructed to carry out the work and make assessments therefor. As sprinkling was already necessary there was no time for preliminary arrangements, but water was turned onto the sprinkler standpipes and the head of the Teamsters' Union was requested to gather the experienced drivers required. Twelve new sprinklers were ordered, which were ready for service by the 15th. On April 4th those already on hand went into service for sprinkling the business district, and after the 15th sprinkling became general throughout the city; 78 teams being placed into service as soon as the districts could be rearranged, and continuing the sprinkling until November 1st.

Meantime, arrangements were being made for preparing an abstract of the property to be assessed, it being required that the cost of sprinkling should be paid for from assessments against the property so benefited. An assistant made this abstract from the records of the County Auditor, which abstract was used in apportioning the assessment, the method of which is described further on. Even more immediately pressing was the necessity of arranging for daily reports of inspectors, complaints, etc. Record blanks were prepared immediately and, as there was no precedent to follow, the form adopted was considered to be to a certain extent tentative. Special filing cases were provided for filing those forms.

There were six inspectors, and these, with one exception, were experienced men. The inspectors reported daily, on form 150, the exact route covered by each team and the number of times covered. The first column was for the number of the route; after being once reported, the route was described by number only. The data from these daily reports relative to each route were tabulated upon form No. 152; which record slip was filed in a Macy check file, divided into ward numbers and subdivided into team districts. There were 12 wards, and the number of team districts in each varied from 4 to 11, the total number of team districts being 78.

Extensions and re-routing were in progress until August 20. A total length of 195 miles of streets was sprinkled, on which abutted about 40,000 lots.

Complaints were recorded on a regular complaint blank. Each and every complaint was given a number and filed consecutively in shelf boxes 7½ by 9 by 3 inches, the number being entered on the last line of form No. 152 for reference.

About the middle of August the property abstract was completed, the records being placed on a blank form, giving the location and description of each property, the feet front of each lot and the total frontage of the several lots in a given piece of property; additional columns being left for entering the assessment against the property. About 2,800 sheets of this form were required for this purpose. It was necessary to have the assessment roll completed before October 15th, and this required putting on an extra force, eight of the regular office employees working overtime for nearly seven weeks at 40 cents an hour. The assessment was completed and delivered to the county auditor on October 11th.

The assessment on any property depended on the frontage, the number of trips per day and the length of the sprinkling period. As the number of trips per day and the length of sprinkling period varied, a great many separate calculations were required, and the streets sprinkled were divided into sections for this purpose, and each section was entered upon a small slip, of which about 800 were used. The product of the number of trips per day and the number of months during which sprinkling was continued was called a "coefficient" (see Form 154), and each frontage was multiplied by this coefficient, and the product of these two times a certain rate gave the assessment for that property.

In order to determine the rate the following calculation was made: Each coefficient was multiplied into the length of frontage to which it applied and the sum taken of all such products. There were 39 coefficients and consequently 39 products, the sum of them all being $38,416,177. The total cost of sprinkling was almost exactly $60,000. The rate was obtained by dividing this $60,000 by the $38,416,177, the quotient being $.00156184. As a check, this ratio was multiplied by each coefficient and this product by the corresponding frontage for each coefficient, the sum of the whole being $60,000. As stated above, this ratio was then multiplied by each of the coefficients, and this product was multiplied by the frontage of each property to which such coefficients applied, in determining the assessment against such property. After the rate and assessment had been thus worked out and the products entered on the several slips, these slips were rearranged alphabetically by street names, subdivided according to wards. The assessment for two round trips per day for a season of 6½ months was about 4 cents per lineal foot, or 2 cents per front foot.

Form No. 153 was the working sheet. Plat frontages from standard office maps were first entered independently. Data from forms 151 and 154 were then added, incidently checking frontages. The separate slips of form 151 were bound in 12 volumes, one for each ward, each volume of about 230 pages being arranged alphabetically by plat names. Transfer was then made from form 153 to 151, the block assessments being prorated thereon according to frontage of lots. Block totals and lot totals were carried in adjoining columns, a balance sheet was made for each ward, and the assessment was complete.

The city railway company bore no part of the expense of sprinkling, which was manifestly unjust and inconsistent, inasmuch as the company is required to bear its prorata of the cost of paving, macadamizing, sweeping and snow removal. On October 25th an ordinance was passed, to take effect in 1910, requiring the city railway company to sprinkle its tracks. The expenses of the season's sprinkling were as follows:

	Payrolls	Bills	Totals
12 new sprinklers	.....	$2,850.00	$ 2,850.00
Team work	$47,594.54	.....	47,594.54
Inspection	2,480.00	33.50	2,513.50
New standpipes	1,096.75	1,248.27	2,345.02
Standpipe repairs	1,845.90	1,189.99	3,035.89
Sprinkler repairs	178.00	510.65	688.65
Liquid Asphalt	.....	772.56	772.56
Cost of making assessment	1,218.00	54.65	1,272.65
	$54,413.19	$6,659.62	$61,072.81
Receipts			1,093.11

Teams received $95.00 per month, rain or shine. The last item, receipts, comprised sums received from railroad companies and others for sprinkling, charges which could not be collected by assessment.

On October 7th the mercury reached 82 degrees F., but on October 12th it was below freezing during the day, which resulted in the bursting of 37 standpipes where care had not been taken to close the ground valves. This feature of post destruction, which in many cases required excavation, accounts to some extent for the heavy cost of standpipe repairs given in the table.

Two standpipe crews of three men each were busy for a month and a half in repairs to hydrants, caused largely by freezing weather and the vandalism of the drivers of ice wagons. The item of general wear was inconsiderable in comparison with the damage caused by these thieves. The waste

Form 30—COMPLAINTS

No. *21* Referred to Commissioner, *Inspector Boldthen*

CITY ENGINEER'S OFFICE

St. Paul, Minn, *Apr. 20, 1909*

COMPLAINT—Personal—Letter—Phone

Payne Avenue, north of Maryland, says teamster goes by on his way home and might haul some water just as well as to go empty.

Name of Complaint, *C. S. Smith*

Address, *Payne and Orange*

COMMISSIONER'S REPORT

Half a mile from nearest stand pipe and not in sprinkling district.

Signed, J. Boldthen

St. Paul, Minn., *May 21, 1909*

Form 154—PRINCIPAL DATA

Mos. *6.5*
Trps. *2*
Coeff. *13*

Street, *Forest*
From *Fauquier*
To *Case*
Begun *Apr. 15* Finished *Oct. 31*
Length *1350* Frontage *2429*
Trips, *2* (including .....trips necessitated by City Ry. occupation)
Rate *.02030392* *$49.32*

Form 150—INSPECTOR'S DAILY REPORT

DEPARTMENT OF PUBLIC WORKS
ST. PAUL, MINN.
DAILY REPORT SPRINKLING ROUTE

April 26, 1909

Ward No. *1* Team No. *5* Tank No. *27* Driver, *Chr. Olson*

No.	Street	From	To	Length	Single Trips per Day	Total Length
53	*Arcade*	*Fauquier*	*Jessamine*	*3,610*	*2*	*7,220*
54	*Weide*	*Wells*	*Case*	*990*	*2*	*1,980*
55	*Forest*	*Fauquier*	*Case*	*1,350*	*2*	*2,700*
57	*Cook*	*Greenbrier*	*Arcade*	*1,300*	*2*	*2,600*
58	*Lawson*	*Arcade*	*Weide*	*430*	*2*	*860*
59	*Case*	*Edgerton*	*Weide*	*2,210*	*4*	*4,420*
61	*Duchess*	*Case*	*Wells*	*985*	*2*	*1,970*
62	*Earl*	*Seventh*	*Cook*	*2,330*	*2*	*4,660*
64	*Sims*	*Edgerton*	*Weide*	*2,210*	*4*	*8,840*
			Total,	*15,415*		*35,250*

I certify the above to be correct.

John Boldthen, Inspector

SPRINKLING ROUTE

District No..... Team No.....

DEPARTMENT OF PUBLIC WORKS
ST. PAUL, MINN.
SPRINKLING ROUTE
For
.....19.....
.....Inspector

Form 151—ASSESSMENT SHEET

WARD *1* DIVISION *1* *Weide's Sub. of Blk. 6, Arlington Hills*

Street	From	To	Description	Lot	Blk.	Frontages			Assessment				Check Totals
						Feet to Lot	Totals		Fractional			Total	
							Feet	Lots					
Forest	*Fauquier*	*Case*	*S. 62 1-2 ft. of*	*2*	*6*	*62 1/2*						*1.28*	
"	"	"	*N. 1/2 of*	*1*	*6*	*62 1/2*	*126*	*2*				*1.28*	
York	*Arcade*	*Forest*	*N. 1/2 of*	*1*	*6*	*30*			*.07*	*.06*	*.48*	*.61*	
"	"	"	*Exc. S. 62 ft. of*	*2*	*6*	*30*			*.07*	*.06*	*.48*	*.61*	
				3	*6*	*30*			*.07*	*.06*	*.48*	*.61*	
				3	*6*	*30*			*.07*	*.06*	*.48*	*.61*	
				4	*6*	*30*			*.07*	*.06*	*.48*	*.61*	
				5	*6*	*30*			*.07*	*.06*	*.48*	*.61*	
				6	*6*	*30*	*180*	*6*	*.07*	*.07*	*.48*	*.61*	
												6.22	*6.22*

Form 152—SUMMARY OF DAILY REPORT AND COMPLAINT INDEX

District No. *5* Ward No. *1* Div. No. *1* Street, *Forest*
Route No. *55* From *Fauquier* To *Case*
Regular Trips, *2*

NUMBER OF TIMES SPRINKLED

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
April															*2*	*2*	*2*	*2*	*2*	*2*	*0*	*2*	*2*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	
May	*0*	*0*	*0*	*1*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*1*	*2*	*2*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*2*	*0*	*0*	*0*	*0*	*0*	*0*	*2*	*0*	*0*
June	*0*	*0*	*1*	*2*	*0*	*0*	*0*	*0*	*1*	*2*	*2*	*2*	*0*	*0*	*2*	*1*	*0*	*2*	*2*	*2*	*2*	*1*	*0*	*0*	*2*	*0*	*0*	*1*	*2*	*2*	*2*
July	*2*	*2*	*2*	*1*	*0*	*2*	*2*	*2*	*2*	*2*	*0*	*0*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*0*	*1*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
August	*1*	*2*	*1*	*2*	*2*	*2*	*1*	*2*	*2*	*1*																					
September																															
October																															
November																															

Memorandum Nos. *21–93*

Form 153—WORKING SHEET

WARD No. *1* DIVISION No. *1* Street, *Forest*
From *Fauquier* To *Case*
Length *1350*

FROM CITY ENGINEER'S RECORD			FROM FORM 151—COUNTY AUDITOR'S RECORD					Asst. Rate	AMOUNT	
Name of Plat	Front-age		Name of Plat	Block	Page	Front-age	No. of Lots		Trial	Equated
Auditor's Sub No. 7	*1,410*		*Auditor's Sub No. 7*	*4*	*31*	*479*	*7*	*.0203*	*9.72*	*9.72*
				3	*29*	*931*	*20*		*18.90*	*18.89*
Nelson's Add and Roman's Re.	*893*		*Nelson's*	*5*	*134*	*517*	*2*		*10.51*	*10.51*
				5	*140*	*250*	*2*		*5.08*	*5.08*
Weide's Sub.	*126*		*Romans*	*2*	*193*	*126*	*3*		*2.56*	*2.56*
			Weide's Sub.	*6*	*250*	*126*	*2*		*2.56*	*2.56*
	2,429					*2,429*			*49.33*	*49.32*

of water, the inaccessibility to hydrants by reason of mud thus formed and the destruction of valves by the use of monkey wrenches, became an intolerable nuisance and heavy expense. The police and water departments were applied to in vain for assistance. Finally, on request of the sprinkling department, the police commission authorized the appointment of several special officers, and on the 12th of July two arrests were made. A workhouse sentence was secured in the Municipal Court, but this was suspended as for a first offence, with the assurance that on further convictions the sentences would be executed. The general effect was salutary, but toward the end of the season this nuisance again became quite general, yet so wary were the water thieves that three days' work of a special officer in early October failed to catch any in the act. Finally two of the thieves were arrested November 8th, and the court imposed a fine of $10 each.

Late in May an extra standpipe crew was put on, and early in August 34 new standpipes had been put in and the location of four others had been changed. Very few standpipes were placed without opposition, but with some slight compromises with property owners, all were finally established where needed.

About 800 feet of an unpaved street and 1,200 feet of a macadamized or paved street were sprinkled with one tank of water, rated at 750 gallons.

During the three months from June 28th to September 28th liquid asphalt at 4½ cents per gallon was applied to about 5½ miles of macadamized and gravel streets, but one application being made on each street. The total cost of this was $2,750, or about 2 cents per square yard. Some sections under heavy traffic required sprinkling with water within three months after oiling. If oil had not been used at all the cost of watering the same streets would have been $1,650. One advantage of the use of the oil was that it liberated six teams, which were urgently needed on other streets, and which could not have been as conveniently provided otherwise. The excess cost of oil sprinkling over that of water sprinkling was properly charged to the maintenance of macadam roads.

In applying the oil the material was heated to 150 or 200 degrees F. in a horizontal, cylindrical iron tank of about 10,000 gallons capacity, by means of a steam coil in the bottom. From this it was transferred by gravity to the sprinkler, which was an Austin-Western water sprinkler of 750 gallons capacity, which had been adapted for oil sprinkling by a change in the spray system only. The two circular sprays were removed and replaced by a 5-inch iron pipe 6 feet long, with perforations along the bottom; this pipe being fed from the tank by three supply pipes, each with a shut-off valve. When the valves were all open this gave a continuous spray of 6 feet. Before applying the oil the macadam surface was thoroughly cleaned and rolled.

Oil for use this year has already been shipped and upon its arrival oil sprinkling will begin. This oil costs four cents per gallon F. O. B. St. Louis. From one-fourth to one-third gallon will be used per square yard, and 5,000 square yards per day will probably be covered by one sprinkler.

ROAD WORK IN NEWTON, MASSACHUSETTS

Dust Laying and Roadway Surfacing—Little Water Used—Oils, Emulsions and Bituminous Dust Layers—Road Should Be Cleaned First—Costs of Various Treatments

By EDWIN H. ROGERS, M. Am. Soc. C. E., City Engineer, Newton, Mass.

The city of Newton, Mass., is one of the suburbs of Boston and is notable as a high-class residential city, with very few factories or mills. It is somewhat peculiar in respect that its 40,000 inhabitants are divided amongst eleven distinct centers of population in different parts of its 18 square miles of area, each village with its own stores, schools, churches, post-office, etc.

The city is not laid out on a checker-board plan, but with an irregular system of streets, common to most New England cities, with 317 public streets, 68 streets part public and part private, and 512 private streets, comprising a total mileage of 142 miles of public streets and 62 miles of private ways not accepted by the city and maintained by the abutting owners.

Being divided into so many villages, there is no concentration of traffic, as is the case in most cities of equal population, and this fact added to the absence of factories, stone quarries, etc., with the consequent freedom from the teaming of heavy loads, precludes the necessity of granite block or vitrified brick pavements, of which there are none, the surfacing of the public streets comprising some 91 miles of macadam and telford roadway and 51 miles of gravel.

In Newton, as in other cities, there are streets which are used much more than others, and in selecting a dust layer for a certain street there are many things to be considered, namely, the appropriation available, the gradient of the roadway, the composition of the existing surface, the extent to which the street is used, the quality of the traffic it is called upon to withstand, and whether it is to be used principally by horses or automobiles or equally by both, as a surface that would be ideal for automobiles might be entirely unsuited to the use of horses. In view of the enormous increase in the number of automobiles each year, many people are unmindful or ignorant that government statistics show that the number of horses in the United States is increasing and that in practically every instance, in providing a road surface, consideration must be given to safe footing for horses as well as to the resistance of the road to the destructive action of heavy pneumatic tires.

The cost of the work is a most important item, as sometimes a higher first cost is the most economical in the long run.

Of the total mileage of streets in the city, the board of aldermen have ordered about 66 miles sprinkled during the summer season, and previous to 1907 this work was done by the use of water, there being 22 water-cart routes, averaging three miles each in length, with a total area watered of about 1,000,000 square yards, at a total average cost, exclusive of superintendence, of $13,000 per season for labor and teams and $3,000 for water, thus making the cost for street watering about 1.6 cents per square yard. The owners of all property abutting on streets ordered sprinkled pay a fixed charge of two cents per lineal foot of frontage per year, whether water or other dust layers are used, this charge being considerably less than the actual cost of watering.

Since 1906 less and less use has been made of water, until, in 1909 and the spring of 1910, no water has been used except in a few instances to temporarily lay the dust in the early spring until the weather became suitable to apply oil, emulsions or bituminous dust layers.

During the year 1909 about 50 miles of roadway on residential streets having a light traffic were treated with the following quantities of oils, emulsions and bituminous dust layers:

Asphalt Oil C Emulsion	11,882 gallons.
Dustoline	6,650 "
Headley's Dust Preventative, No. 1	61,000 "
Speares's Road Binder	27,600 "
Standard Emulsifying Road Oil	7,670 "
Tarvia B	37,128 "

A sufficient number of applications of the above materials were made during the season, as needed, at the following cost:

Labor and teams	$4,496.36
Materials	13,555.67
	$18,052.03

The average cost of treatment with the above materials was about four cents per square yard.

In applying dust layers of any sort it should be accepted as a fundamental principle that the road should be clean and free from dust, which is easily accomplished by the use of a horse-drawn sweeper and street sweepers' brooms. If a road is dusty or dirty, the oils or emulsions will not adhere to it, but will simply stick to the surface dust and will be picked up and thrown about by the wheels of passing vehicles, particularly when newly applied. It is also impracticable to apply a dust layer to a surface that is not smooth and hard, such as a macadam road in good condition or a gravel road that has become consolidated by use or thorough rolling.

While all of the different villages of Newton are connected each to the other by thoroughfares, there may be considered to be three main thoroughfares running in a general easterly and westerly direction and three others running in a general northerly and southerly direction. Commonwealth avenue, one of the east and west thoroughfares, is about four and a half miles in length and has two roadways, from one of which automobiles are excluded for the benefit of the horse-drawn traffic. As this street is a portion of the main automobile route from Boston to Worcester, Springfield and New York, it is used daily by large numbers of motor vehicles and the roadway reserved for them has, since 1907, been treated throughout with different bituminous preparations, principally tarvia and asphaltoiline. In 1909 a portion of this roadway, 1,850 feet in length, had become wavy from an excess of tarvia originally used. Two inches of the surface was removed with a scarifier and a new surfacing of tarvia A and crushed stone applied by the penetration method, using three-quarters of a gallon of tarvia to the square yard, covered with a thin application of one-quarter of a gallon to the square yard of Texico and screenings well rolled in. This roadway is 36 feet in width on a five per cent grade and the area resurfaced amounted to 7,400 square yards. The cost was 41.5 cents per square yard, divided as follows:

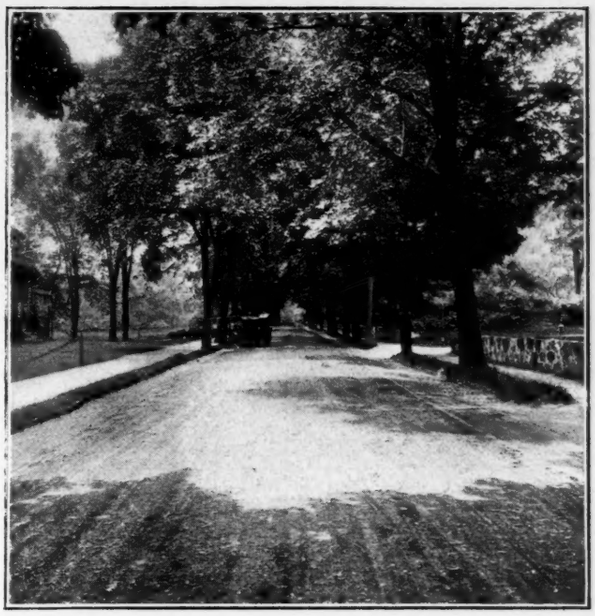


FIG. 1—ASPHALTIC OIL AND SAND ON NINE PER CENT GRADE

Labor	$1,728.96
Texico	99.00
Tarvia A	634.72
Crushed stone	368.80
Roller	240.00
	$3,071.48

FIG. 2—SPRAYING ASPHALTIC OIL FROM HEATED TANK WAGON

FIG. 3—SPRINKLING SAND AFTER APPLYING OIL

The old tarvia removed was used to surface a side street having light traffic. The area covered on this side street was about 3,200 square yards and the cost for labor, teams, roller and stone screenings amounted to $373.20, or a cost per square yard of about 12 cents. This surface should last some years.

The cost of maintenance on the balance of the automobile roadway on Commonwealth avenue, four miles in length, was $3,854 for materials and labor for repairing the surface where it had become worn during the previous three years. No repairs will be necessary on this roadway during the present season and, as the surfacing is now so heavy, it is anticipated that the repairs required during the next few years will be very slight. Owing to the grades of this boulevard, it is not used as a teaming thoroughfare, but mainly for pleasure vehicles.

Tarvia A has been used on other streets in Newton at a cost varying from 28 cents to 46 cents per square yard, according to the amount of stone necessary to use in resurfacing and the accessibility of the street to a crushing plant, of which the city maintains three in different sections. Tarvia shows excellent results in many ways, being particularly well adapted to resist automobile traffic, but is not so well suited to horse traffic, being apt to break up in the winter under the action of the calks on horses' shoes and is slippery for horses under some conditions, particularly on steep grades, thus requiring sanding under certain weather conditions.

In 1908 tarvia B to the extent of about 14,000 gallons was applied to about 51,000 square yards of roadway on residential streets at a cost of 1.7 cents per square yard. The same treatment has been reapplied in 1909 and 1910, using in each case a less quantity of tarvia, and now these streets have a hard, smooth surface resulting from the three applications of tar which should not need any repairs for two or three years.

Another main thoroughfare across Newton is Washington street, which is comparatively free from heavy grades and has a traffic about evenly divided between horses and automobiles. In 1909 a portion of this street about a mile in length was treated with a thin coating from one-eighth to one-quarter of an inch in thickness, with a mixture of coarse sand and liquid asphalt or asphaltoiline in the proportion of one gallon of liquid asphalt to one cubic foot of sand, mixed at the pit in a concrete mixer or by hand, the sand and oil both being heated before mixing. The cost of this treatment amounted to about three cents per square yard.

Chestnut street, one of the thoroughfares running in a northerly and southerly direction, has a long 9 per cent grade and considerable heavy horse teaming as well as many automobiles. This street was treated in 1909 in the same manner as Washington street, went through the winter in a most satisfactory condition, has had to have but slight repairs this season, and was not slippery for horses at any time during the winter. Figure 1 is a view of this street on the above mentioned grade.

During the present season of 1910 several miles of streets are being surfaced in a similar manner with some modifications in the method of application. Different makes of asphaltic oils are being used having from 60 to 90 per cent of asphalt and are applied by sprinkling directly upon the road from specially designed steel tank wagons. The cars in which the oil is shipped are fitted with interior pipes for steam heating, are run upon a trestle, heated by steam from a steam boiler, and the contents allowed to flow by gravity into the tank wagon, wherein the oil is heated still further to a temperature from 140 to 200 deg. by means of kerosene burners working under air pressure, a part of the wagon fittings.

The wagon is driven over the road to be treated and the material applied through the attached sprinkler, and, being heated to the above mentioned temperature, flows freely in a very thin layer upon the surface. Coarse sand or gravel screened through a half-inch screen is immediately spread evenly on the street in a layer just thick enough to cover the oil. The roadway is not rolled and vehicles are allowed to drive upon it at once as the wheels roll the sand down into the asphalt without picking up the material and throwing it about.

The cost of this treatment is about four cents per square yard, which includes cleaning the roadway, patching slight depressions with stone screenings, and applying the oil and sand. This treatment can be applied when the roadway is slightly damp with equally good effect and affords one of the most effective dust layers used, for the reason that it is lasting, thoroughly lays the dust, is cleanly, is not slippery on steep grades, and effects a building up of the roadway with each application, as the sand makes a new wearing surface. Figure 2 shows the oil being sprayed upon the roadway and Figure 3 shows the sand being applied. On a residential street the first application of oil and sand should last from one to two years. As the asphalt is not volatile, repeated applications of such oil with sand forms a hard surface which is waterproof. In this climate there are usually one or two months in the spring in which the roads are soft while the frost is coming out of the ground, and at such times the asphalt becomes better incorporated with the material on the top of the road and, when the road is dried out, a good surface is formed.

In conclusion, it would appear that no one treatment can be said to be the best as a dust layer, as different conditions govern the use of different materials and it is only by continued experiment that the best material can be found for the special conditions and problems to be solved in any given case.

DUST LAYING IN NEW BEDFORD

As we go to press we receive, from Mr. C. F. Lawton, Superintendent of the Street Department of New Bedford, Mass., information concerning dust laying in that city additional to that given on page 864.

Dustoline is, as stated there, used almost exclusively. It was first used in 1907 on five miles of road, and the results were so satisfactory that in 1908 it was used on 27 miles. This year one application has already been made to most of the 75 miles of road in the city. This material is a free-flowing liquid, applied by ordinary sprinkling wagons, and requires no heating or dilution. Consequently the cost of application is low. It penetrates the surface almost immediately on a warm day, and it therefore is not necessary to close the streets while the work is in progress. Concerning this material Mr. Lawton writes:

Our extensive use of it would prove that as a road preserver it has great value, for it not only prevents the fine surface material of the road from blowing away, but in heavy rains it holds the same surface so that it does not wash away. This, of course, protects the underlying body of road material from becoming disintegrated, and under the severe conditions to which our roads are now subjected this quality is of inestimable value.

There are several grades of this preparation which are used at different times of the year, and on different classes of roads, so I cannot say how it would work under conditions different from our own.

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Road Treatment Terminology

KNOWLEDGE of how to do a thing is, of course, more important than the ability to describe it. Nevertheless when, as in the case of the application of road binders, experimenters throughout the country are endeavoring to obtain as quickly as possible the maximum amount of information not only by their own experiments, but by knowledge of what others are doing, it greatly simplifies matters and conduces to much more clear and certain information if an agreement can be reached as to the meaning of terms. The absence of such agreement is being realized as a serious difficulty by officials and others who are now endeavoring to describe the road treatment work which they are doing. Tars and oils are being applied to broken stone roads by sprinkling, by pouring and by injecting in jets having considerable velocity; and this is done to old roads, which have received no preparatory treatment in some cases, while in others they have been relieved of all loose dirt, and in still others they have been brushed or otherwise treated so vigorously as to remove all the dirt above and much of that which is between the surface stones. In new construction, bituminous material is applied in a cold, semi-liquid form, or a material heavy in bitumen is heated before use. This may then be applied by mixing it with the stone before this is laid upon the street, or the stone may be rolled and the material poured in afterwards.

Each of these methods of treatment is variously designated by officials in describing their experiments and work. Many of them, in order to make clear their explanation of such work, have described more or less at length the process adopted each time it is referred to, and this is probably desirable until there be a general agreement as to the meaning of terms which can be applied to at least the more common methods. Several societies have appointed committees to struggle with this question, and there is every probability that some definite conclusions will be reached before the end of this year.

Meantime there has been a more or less general acceptance of certain terms, and we hope that, unless some good reason be advanced for changing them, they be generally adopted. The term tar macadam, asphalt macadam or bituminous macadam has been applied to the mixture of bituminous substances with broken stone, whether added before or after the latter has been placed upon the road. To avoid the ambiguity thus occasioned there has been a partial adoption of two terms; the application of the bitumen to stone newly placed upon the road being called bituminous macadam, and construction by mixing the bitumen with the stone before laying being called bituminous concrete. These terms are believed to be suggested by analogy, since the bitumen as a binder takes the place of the binder of water and screenings, and in ordinary macadam the binder is placed upon the stone after it has been put upon the road and rolled, never mixed with the stone before application. It is self-evident that the mixing of binder and stone (with or without sand) before application to the road is the same treatment as is given to concrete.

Improving Sand Roads

WHILE in certain sections of the country clay roads become practically impassable in the spring or during other very wet seasons, possibly those districts where the soil is a loose, comparatively clean sand have more all-the-year-round difficulties than any other. In this issue are described three methods of treating such sand roads, each of which appears to have been satisfactory. These are not only dissimilar in method, but are adapted to different conditions, both of soil and of travel. Sand-clay roads have been built to the extent of several hundred miles in Kansas, the South Atlantic States and some others, and seem to serve excellently well where the materials for their construction are available and the traffic is chiefly that of a farming community. In some places the substitution of asphalt for clay as a binder, as is done in eastern Massachusetts, might have advantages of cheapness or of greater durability. For heavy hauling probably neither of these would be anything like as durable as the macadam with bituminous binder used on the dry sand roads of New Jersey.

These three descriptions of as many methods of securing a good road under conditions where a few years ago it was considered impossible to obtain a passable road show what great improvement has been brought about in methods of road building within a very few years; and also serve to illustrate the principle that different conditions may demand, or at least be more satisfactorily met by, diverse solutions.

Bituminous Road Treatment

IN the articles in this issue, which were obtained with an idea of representing modern practice in road treatment, possibly nothing stands out so prominently as the quite general use of bituminous substances for dust layers or macadam binders. The roads described have all of them been fairly successful and many of them remarkably so; but this has not been the

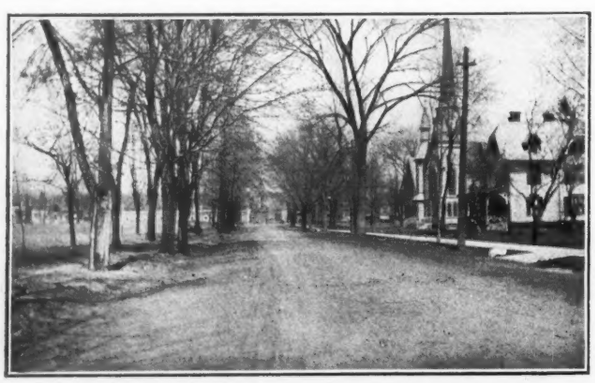
universal experience, as a number of mistakes have been made, and in obtaining our present knowledge it has been necessary to eliminate by experience some erroneous ideas and impracticable theories. There is much yet to be learned, but the greatest need at present is for a general comparison of results by those who have been experimenting along these lines. In this the technical journals are of the greatest assistance, and the engineer or road superintendent who has charge of work of this kind and who does not keep himself posted through these mediums is delinquent in his duties.

While mistakes in the past have been excusable, many are still being made which could be avoided if those in charge would profit by the experience of others. One instance has come to our notice this spring of an attempt to lay the dust upon a dense macadam surface by the application of a thick bituminous oil. In this case the oil applied was so thick that it was difficult to spread it by brooms after it had been poured upon the surface, and little, if any, was absorbed by the macadam. In a very few days or even hours the oil had been tracked over the sidewalks and into the houses of most of the adjacent properties and suit has been brought against the city by at least one occupant of abutting property. Others have used asphaltic oils as dust layers on macadam with great success and with practically no annoyance such as that just described, and there would now seem to be no reason why equally satisfactory results might not be obtained anywhere by taking advantage of past experience.

DUST LAYING IN SUMMIT, N. J.

Summit, N. J., is a residential suburban town of about 7,500 population, located twenty miles from New York City. As its streets are all of macadam the problem of dust prevention and road preservation has been given a good deal of attention. The macadam laid there is of a high standard of excellence because good materials are available and attention has been paid to the workmanship. The stone is trap rock, and gravel containing clay or clay alone is used as binding material. Quite a large number of road preparations have been tried. The authorities have been inclined to make a trial of any material that has been offered to them, stipulating, however, that it will not be paid for unless it substantially fulfills the claims that have been made for it. During the past year (and the practice will probably be continued this season) the principal materials used have been Dustoline for dustlaying and Tarvia and Glutrin for that sort of dust prevention which results from avoiding its formation.

The use of water has not been favored in Summit because of its higher cost. To take care of the thirty miles of macadam by sufficient sprinkling it is estimated would cost $6,500, whereas by the methods now employed the cost of dust prevention is kept down to $3,500. Most interesting, perhaps, among the materials used is glutrin, which possesses several peculiar characteristics. This material has as its basis a vegetable matter of a ligneous nature and certain inorganic chemicals, both being soluble in water. In appearance it looks much like thin molasses. An observer may easily understand its nature by moistening his fingers with it. At first the material feels greasy or at least has a lubricating property. After a few minutes the water evaporates and his fingers become sticky as if dipped in glue. An application of water readily washes the material away without leaving a stain. The action of the glutrin on the roadway seems to be that it increases to a remarkable degree the binding quality of the fine material in the macadam—the inorganic binder. It prevents the formation of dust by hardening the roadway. This it does to such an extent that the surface of the macadam may even assume a polish something like that of an asphalt pavement. This is because the small particles of stone are so firmly held in place that a horse's shoe cuts and leaves a smooth surface on them. It is also claimed that, should the surface be broken up by any cause, the particles will be recemented by the glutrin if the road is given a wetting.



STREET IN SUMMIT TREATED WITH GLUTRIN

The first Summit roadway of any importance treated with glutrin was Springfield avenue. This is the principal road leading into the town from the west. About a mile and a half of this road was worn out and was given a complete new coating of macadam and glutrin was used in the course of the construction. After the 1½-inch stone had been laid, bound in with gravel and clay in the usual way, the glutrin was applied. A solution of 50 per cent in water was put in a sprinkling cart and spread over the street. The sprinkling valve and the speed of the cart were regulated so as to give as heavy a wetting as possible without waste of material. The three-quarter stone was spread about a week after and another application of glutrin of the same strength was applied in the same manner. After another interval of a week the fine screenings were put on and a third dose of glutrin given, the same as before. Mr. L. A. Oaks, the Superintendent of Streets, believes from later observation that this last application was of little use and was not necessary. The glutrin penetrated the roadway to a depth of about four inches. During last summer this street was given two treatments of Dustoline. It is now in excellent condition though subjected to a heavy automobile traffic.

In treating the mile and a half of roadway, which was 16 feet wide, 40 barrels of 50 gallons each were used. The cost of the glutrin was 12 cents per gallon, making the 50 per cent aqueous solution cost 6 cents per gallon for material. One cent per gallon is estimated as the cost of spreading all road preservatives used in Summit.

On Maple street another method of using glutrin was used. This is one of the main cross streets not far from the center of the town. The macadam roadway was three years old. Two applications of 50 per cent glutrin were given in the spring of last year and, later in the season, every two weeks a light sprinkling of a 20 per cent solution was given. No cleaning of this street was necessary during the summer. The surface produced by the use of glutrin was so hard and free from sticky liquid that wind and rain kept it clean and no expense was put on the street during the summer for cleaning. Sections of other old roads, where the surface was generally raveled, were treated with glutrin. These sections were rolled with a steam roller and 50 per cent solutions applied, with satisfactory results. A section of new construction, made with only stone and stone screenings without the usual clay or gravel binder, was treated with glutrin. The results were disappointing, due presumably to the fact that the glutrin, as stated, acts to increase the binding quality of the fine binding material and there was not a sufficient quantity of stone dust there.

This spring, with the advantages of last year's observations as a guide, a section of new construction on Park avenue was treated with glutrin. The 1½-inch stone was laid, bound with gravel and rolled, and the three-quarter stone was put on before any glutrin was used. Then two treatments of 50 per cent solution glutrin were applied at intervals of a day or two. Then fine stone screenings were scattered over the top. This is the main street leading into the town from the south and the grade is quite steep in places. Mr. Oaks expects that the surface will polish and that to avoid slipperiness it will be necessary to scatter stone screenings over the surface perhaps twice during the season. Cleaning the street will probably be unnecessary.

NEWS OF THE MUNICIPALITIES

Current Subjects of General Interest, Under Consideration by City Councils and Department Heads—Streets, Water Works, Lighting and Sanitary Matters—Police and Fire Items—Government and Finance

ROADS AND PAVEMENTS

Tar Roads Favored in Tennessee

Bristol, Tenn.—The Sullivan County Road Commission, which is expending $300,000 in the building of macadamized roads in that county and which has been experimenting with the use of tar in bonding the macadam, is delighted with the experiments thus far conducted. Short pieces of road have been built by the use of tar and they appear to be far superior to other roads, in that they have a decided resiliency not possessed by the others and are waterproof.

Will Use Oil to Lay Dust

Easton, Pa.—The oiling of streets to allay dust is being generally resorted to throughout Eastern Pennsylvania. Slatington has ordered 15,000 gallons of oil, which will be paid for by private subscriptions of its citizens. Easton has ordered 50,000 gallons and bought its own sprinkler. Quakertown is about to order 30,000 gallons. The Commissioners of Northampton have instructed the County Engineer to apply oil to all the pikes in the county.

Railroad to Help Pay for Street Oil

Kearny, N. J.—Alfred B. Anderson, Chairman of the Street Committee of the Town Council, has received from Secretary Edwin W. Hine, of the Public Service Railway Company, a letter in which the secretary explained that the corporation would pay a share of the cost of sprinkling oil in Kearny avenue from the Erie Railroad in the southern end of the town to Belleville turnpike. Mr. Hine stated that the company would contribute as much toward the use of oil as it has heretofore paid toward the cost of the water that is used along the route of the car tracks. In other words, the corporation will pay a fixed amount and leave it to the town officials to say whether water or oil shall be used. The tarvia with which the avenue is to be coated has been ordered, and will be spread as soon as received.

Auto Oil Sprinkler at Work on Streets

Plainfield, N. J.—Street Commissioner A. J. Gavett has secured two oil-sprinkling cars of the auto type, known as the "Saybolt," from the Standard Oil Company to sprinkle oil on the streets of the city. The device is the patent of George Saybolt, of the Standard Oil Company. The cars are provided with tanks holding 1,000 gallons of oil. The machine is equipped with an air compressor, operated by a gas motor, and the air forces the oil through the apparatus in a fine spray. It puts a thinner coat of oil on the street and with more power than in the ordinary way. It puts the oil on in less quantity, requiring more frequent treatment, but permits the immediate use of the road. Arrangements have been made with the Standard Oil Company to put this oil on by contract, the price being 1 1-5 cents per square yard.

Cost of Operating Asphalt Plant

San Francisco, Cal.—The following recapitulation of work done by the Municipal asphalt plant during March and the cost of same has been prepared by the bookkeeping department of the Board of Public Works:

Work at plant.	Cu. ft. of Mixture	Cost of Material
Wearing surface	26,328	$6,939.91
Binder	12,036	1,648.92
Labor at plant	.....	2,550.10
Repairs, oil, fuel, etc	.....	1,547.35
		$12,686.28

Work on the Streets	Cost of Labor and Teaming	Square Feet Laid	Cost Per Sq. Foot
General repairs (roving)	$6,025.94	142,509	$0.0422
Total cost of material to street			$12,716.28
Total number of square feet laid			142,509
Cost per square foot for material			$0.0892

	Cost of Labor per Sq. Foot	Cost of Material per Sq. Foot	Total Cost per Sq. Foot
General repairs	$0.0422	$0.0892	$0.1314

City May Aid in Oiling Macadam

Oakland, Cal.—At the meeting of the City Council the following communication was received from City Engineer F. C. Turner and referred to the Street Committee:

It is reported to this office that many property owners who are considering the macadamizing of their street object strongly to paying the difference between the cost of plain macadam and oil macadam laid in accordance with our present specifications. This difference amounts to two or two and one-half cents per square foot. As we have never conducted enough experiments to determine the minimum amount of oil and extra labor necessary to accomplish the desired results, it is possible that our specifications are over-exacting in this respect. Furthermore, the greater part of the old city has been improved with plain macadam, so that the sudden increase in cost of street work appears to be a discrimination against the newer districts.

In view of these facts, and also in view of the saving in water and repair bills accompanied by the use of oil it seems to me no more than fair for the city to share this extra cost of new construction to the extent of the cost of oiling old macadam streets. I therefore suggest that in future specifications they be permitted to call for one oiling only, the second, or surface oiling, if found necessary, to be done by the city. This first oiling at a cost of about one cent per square foot would cement the main body of macadam. If it were found that the oil did not work up evenly and give uniform bituminous surface, the lightest possible coating of oil, supplied by the Street Department, would complete the work at an expense to the city less than the cost of surface oiling an old street.

Good Bitulithic Pavement Better than Bituminous Macadam Bond

Rome, N. Y.—The Board of Public Works has recently let contracts for paving work. The work this year will be that of paving Floyd avenue and Stanwick street with bitulithic at a cost of $31,318.70. This pavement will be placed on a 4-inch concrete base. The engineer was also directed to prepare specifications for the several kinds of pavement ordinarily bid upon for four other streets, two of which, however, will not be improved until next year. Owners on the streets which are to be paved this year have been notified by the engineer to lay all water and sewer connections at once. The practice in Rome, as in a number of other cities, is to receive bids on different materials before deciding what material shall be used on a given street, the decision being made to suit the property owners where possible, this having been the case in the contracts just awarded. Rome has been having the same difficulty with bonding companies as have a number of other cities, the bonding company of the Interstate Paving Company, which had laid a bituminous macadam, which is rapidly deteriorating, having notified the city that that company had gone into bankruptcy and the city could take such action as it saw fit. The city has now about ten miles of paved streets, of which about one-half is bitulithic, one-fourth brick, and one-fourth asphalt.

Street Oiling Will Not Be This Year

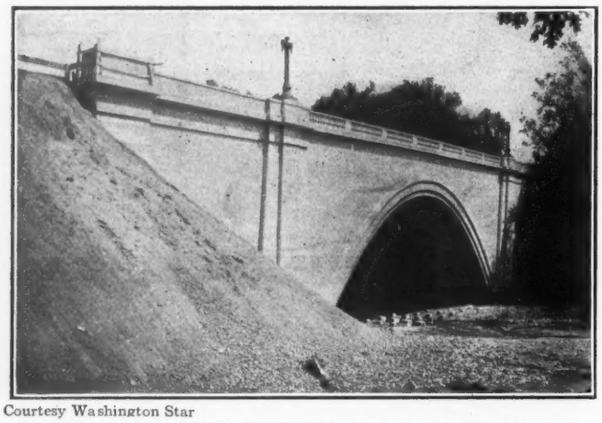
Taunton, Mass.—The Committee on Streets and Bridges will not recommend the adoption of any system of oiling streets for the present year. It will be open, however, for private individuals to contract by private subscription for oil or water as they see fit. At present the city will not lay out any district for treatment, or make any assessments for such a service. The matter is not abandoned and the committee will make tests of its own in different sections of the city.

Residents Oil Turnpike

Wrightsville, Pa.—The pike company has macadamized Hellam street, from Second to Third streets, and from Front street to Second. There have been 20 barrels of oil ordered for the purpose of oiling this block and from Third street to Seventh street. The residents along these sections of Hellam street have determined to avoid the dust this summer caused by the trolley cars and the automobiles.

Piney Branch Bridge Finished

Washington, D. C.—This big bridge is 272 feet long, with a total width of 65 feet, and the roadway is 54 feet above the stream. Although there were no great engineering problems to contend with in spanning the gulley through which Piney Branch trickles, the fine work of finishing off the concrete on parts of the bridge is looked upon by the Engineer Department of the District Government as something to be remembered. Crushed granite was used in mixing the concrete. The stuff was set up in molds, and before it was too hard to work with the soft part of the surface was brushed away with stiff brushes, leaving the



Courtesy Washington Star

CONCRETE BRIDGE OVER PINEY BRANCH, WASHINGTON, D. C.

granite particles glittering so that the finished product looks something like real stone. Ornamenting the bridge are lamp posts, newels and balustrades designed by R. L. Watmaugh, a Washington architect, graduate of the Beaux Arts. Four bronze tigers will be placed upon the bridge as soon as the famous animal sculptor, A. Phinister Proctor of New York, finishes them. The bridge cost $135,000. The first half of it, called by the engineers the first "rib," cost $50,000, and was built in 1907 by the Penn Bridge Company. The other half, or "rib," and the finishing of the roadway cost $85,000, and were done by the Cranford Paving Company. Each rib of the bridge has a cellular abutment. The arch of the bridge is parabolical in shape and has a span of 125 feet and a rise of 39 feet above the springing line. Concrete is used throughout, the arch being unreinforced. The roadway and sidewalk are supported from the arch by concrete side walls and reinforced concrete columns. The roadway has a tarred macadam, and granite curbs. The sidewalks are of cement. The bridge was designed by W. J. Douglas, and William N. Reynolds, engineer-in-charge.

Building Contractors Must Not Block Walks

Syracuse, N. Y.—Commissioner of Public Works Frank M. Westcott has notified building contractors that they will not be permitted to close sidewalks in their work hereafter. As soon as their excavation work is done, the contractor will be expected to build a platform over the walk if he desires to use that space for storing materials.

Scoria Blocks from Abroad

Washington, D. C.—A carload of paving blocks from England will be delivered to the Cranford Paving Company in Washington some time this month. The marine reports state that the British tramp steamer, Paul Paix, has been chartered to load several hundred thousand of scoria paving blocks at Middlesboro, England, where the blocks are manufactured, and to deliver them direct to Washington. The blocks are to be used on the traction lines of the city.

Will Test Dust Layers

Paterson, N. J.—Fifty miles of roads in Passaic County will be treated with dust layers this year by County Engineer Garwood Ferguson. Most of this work will consist of application of oil and tar binders. Two new materials will be tried shortly. The Solvay Process Company will spread granulated calcium chloride on Hamburg avenue. The Sanitary Oiling Company, using a product of the Paterson Gas Co., will lay a sample on Madison avenue.

SEWERAGE AND SANITATION

Pumping Station's Cornerstone Laid

Baltimore, Md.—Members of the Sewerage Commission and other city officials watched Gen. Thomas J. Shryock, Grand Master of the Grand Lodge of Masons, of Maryland, lay the cornerstone of the new pumping station at East Falls avenue and President street last week. A copper box placed inside the stone contains the names of members of the Commission, architect, builders and engineers, a Bible, municipal handbook, various municipal reports and copies of the Baltimore daily papers. Mayor J. Barry Mahool, who was the speaker of the occasion, said the foundation would cost $119,754.90; the superstructure, $179,200, and the machinery, $450,000. Three engines are to be installed, he explained, two more to be added as the volume of sewage increases. Each engine will pump 27,500,000 gallons of sewage every 24 hours.

Food Inspection at Ardmore, Okla.

Ardmore, Okla.—The City Board of Commissioners is having prepared for passage an ordinance providing for the inspection of food products, slaughter houses, milk and dairy products and such other things as come under the pure food laws of the State and as require to be placed under the supervision of the city for the purpose of protecting the health of the town. Dr. Marr, State Inspector, gave a concise and forcible talk on the necessity of having such an ordinance, and representatives of the different occupations embraced under the provisions of the ordinance also presented their views.

To Enforce Milk Inspection Laws

Binghamton, N. Y.—Health Commissioner John E. Bloomer has drawn up a circular letter which will be sent to all milk producers whose product is sold in this city and which does not come up to the standard. It is planned to secure the name of every milk dealer selling to creameries or private residences and cause an inspection to be made of the premises where this milk is produced. If conditions are not satisfactory or a test of the milk shows contamination the fact will be embodied in the circular, together with instructions how to remedy the trouble. Close watch will then be kept of the milk producer to see that he complies with the requirements.

City Bulletins in Health Campaign

Columbus, O.—The City Health Department is planning a health educational campaign by means of bulletins to be published and distributed by the Board. Subjects of prime importance to the health of the public will be treated in the bulletins. When they touch on a theme of special interest to any class, copies will be mailed to those persons interested. For example, the June bulletins will deal with milk and its care, and all dairymen supplying Columbus will be mailed copies. The Board is making special plans to combat summer illnesses, and particularly the affections of children and babies. The fly evil also will be dealt with in the proposed bulletins.

Free Service by Health Bureau

Denver, Col.—The City Health Department vaccinates all who apply, furnishes anti-toxin for diphtheria cases, fumigates houses where there has been contagion, examines all milk and water samples and makes bacteriological examinations of throat cultures submitted by physicians, all of this service being free of charge.

Vegetables from Sewage Farm Barred

Fort Worth, Tex.—The City Commission has adopted a resolution presented by Commissioner Mulkey prohibiting the admission into the corporate limits of vegetables raised on the irrigated sewage farm near San Antonio. It was held that these vegetables are unwholesome, and the City Physician was instructed to take steps to prevent the sale or consumption of them in Fort Worth.

Iowa Council Repeals Milk-Test Law

Oskaloosa, Ia.—Under pressure brought to bear by dairymen and farmers, the City Council weakened on the tuberculin test ordinance and repealed it. A new ordinance will be drawn providing for milk inspection.

Discretion of Health Officer in Enforcing Quarantine

Binghamton, N. Y.—The latitude a Health Officer may exercise in enforcing quarantine was the principal issue in a hearing that was held by the local Health Commissioner on charges preferred against Health Officer D. S. Burr by a local physician. Several different charges were included in the complaint, the most important being that the Health Officer did not quarantine a number of contagious cases as required by the State Health Law. The defense showed that the Health Officer inspected the particular premises named but decided in each case that the patient was not suffering from the contagious disease reported by the attending physician and therefore did not enforce a quarantine. In reply, the complaining physician produced evidence that many of the patients died of the disease from which the Health Officer concluded after one visit they were not suffering. After a series of hearings occupying several months, at which a large number of local physicians were called as witnesses, the Health Commissioner has just rendered his decision to the Mayor, in which he finds the Health Officer guilty of every charge specified but recommends that he be retained in office because of his general good work along other sanitary lines. As a result of the case it is proposed to secure the passage of an ordinance requiring the Health Officer to quarantine every suspected case of contagious disease reported by a physician, whether he thinks it ought to be quarantined or not. Such a measure, it is believed, would protect the residents from a too wide latitude in quarantining.

Would Wipe Out Chicago's Sewer Bureau

Chicago, Ill.—Division of the work of the Bureau of Sewers among the Health Department and the Bureaus of Engineering and Streets is recommended by B. J. Mullaney, Commissioner of Public Works, in a letter to Corporation Counsel Brundage. Mr. Mullaney asks advice on what legislative steps must be taken to transfer the three classes of work. "The Bureau of Sewers as at present constituted and operated is in many respects an absurdity," Mr. Mullaney says. "As a consequence, much of its work is inefficiently and wastefully done." Mr. Mullaney contends that the cleaning, repairing and maintenance of sewers and catch basins should go to the Street Bureau, the supervision and inspection of the installation of house drains to connect plumbing systems in buildings with the sewers to the Health Department and the operation of the five sewage pumping stations to the Engineering Bureau.

Chicago's Typhoid Fever Death Rate Lower Than Ever

Chicago, Ill.—Chicago's typhoid fever death rate is decreasing slowly, according to the weekly bulletin of the City Health Department. Last year it was the lowest ever reached by any American city of the first class, and this year it promises to be even lower. Washing of all vegetables thoroughly before they are used and care in the use of milk for babies are urged as additional precautions to keep the rate down.

Beware of the Fly, Says Dr. Grieve

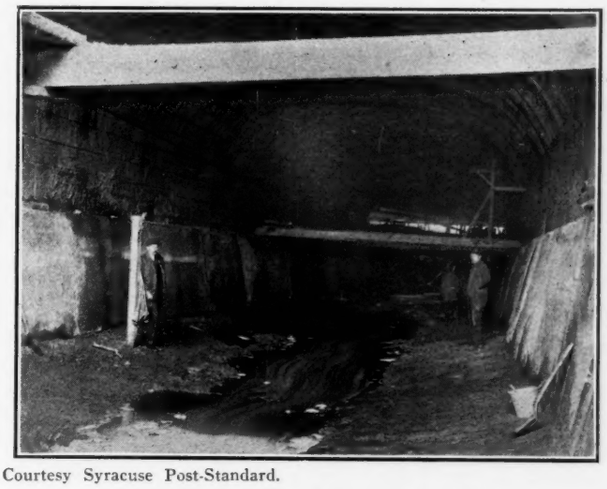
Spokane, Wash.—At this time of the year when, according to City Health Officer M. B. Grieve, an ordinary pair of typhoid germs in good health and without any extraordinary proclivities commencing to breed at sunrise, result in a family of 100,000,000 husky and active bacilli before nightfall, it is well to beware of the housefly, now beginning to swarm for the summer of 1910.

Be on your guard against the housefly, the principal spreader of typhoid, which flourishes in the fall just after the deadly insect has finished his work, but to a large extent it transmits tuberculosis and other diseases. Infant mortality in the summer from enteritis and entero-colitis is due largely to the housefly infecting the milk of bottlefed babies.

There is no law making the screening of windows mandatory and the Health Department can only give warning, except in cases where there is already disease, such as typhoid, when we not only screen the house where the patient lives to prevent flies from bearing infection elsewhere, but in many cases we screen the patient in one room to prevent the insects getting to other parts of the house and causing the sickness of the rest of the family. Emphatically, to prevent disease this summer and fall every home in the city should be screened.

Culvert for Creek Under Canal

Syracuse, N. Y.—The work on the Onondaga creek improvement in the culvert running under the Erie canal as completed has deepened the creek channel at this point by eight feet. Walls of reinforced concrete with an 18-inch concrete bottom reinforced by steel have been laid beneath the culvert. Chief Engineer Glenn D. Holmes, of the Syracuse Intercepting Sewer Board, said that he regarded



Courtesy Syracuse Post-Standard.

CONCRETE CREEK CULVERT UNDER CANAL

the work in the creek culvert as one of the most successful features of the creek improvement work. The main work of the creek improvement will be continued south through the city from West Belden avenue now that the connecting link under the canal is finished. The contractors are temporarily delayed in the work, awaiting the arrival in this city of a steel flume, ten feet across and from 500 to 600 feet long, which is being shipped in sections. A big shaft, 40 feet across and 30 feet deep, is being sunk at Belden avenue and West Water street in connection with the intercepting sewer work. A connection will be made here with the Butternut street and Burnet avenue sewers.

Found Oldtime Sewer Filled with Concrete

Newark, N. J.—Investigation by Board of Works employees into the stoppage of a sewer in Lawrence street, revealed the fact that the pipe had been choked with concrete when the improvements to the Central Railroad were made. The inquiry was begun on the complaints of property owners in the thoroughfare between Hamilton and Mechanic streets. The sewer was built by private owners about 25 years ago, and the city had no record of its existence. It is constructed of 10-inch pipe. Part of it, for a distance of approximately 100 feet, is beneath the concrete retaining wall of the Central Railroad. In piling in rock and stone for the wall's foundation, the sewer pipe was punctured. Through this aperture cement flowed and solidified. As a result the sewer is packed for 100 feet with a solid piece of cement, which occupies all but about an inch of the pipe. It will be necessary to lay an entirely new drain through the street. Acting General Superintendent Hallock has communicated with the railroad officials in an effort to get them to share part of the expense.

New Official Would Improve Conditions

Tacoma, Wash.—With a view of acquainting himself with sanitary conditions and precautionary measures taken in other cities, so that he may be enabled to make an intelligent recommendation to the Municipal Commission, Health Commissioner E. M. Brown has spent a week or more visiting Port Townsend, Seattle and other points on Puget Sound. He has also spent a share of his time in quiet inspection work throughout Tacoma and before long expects to be ready to ask the commission for an appropriation to enable him to do more efficient work in the Health Department. Among the more important matters to be considered with the commission by Dr. Brown is the construction of an incinerator.

WATER SUPPLY

Earthquake Increases Water Supply

Corona, Cal.—The earthquake of four weeks ago has resulted in something of a freak of nature, in that it has increased the water supply of the city. The Temescal Water Company secures its supply from the Coldwater, Mayhew and Gregory canyons. During the entire year the flow varies but slightly, but since the quake the total increase for the three canyons amounts to 75 inches. As water sells for $1,000 an inch, this increase is worth $75,000.

Water Company Reduces Rates

Hazleton, Pa.—After months of consideration the Hazleton Water Company has decided to make a reduction in water rents to the large, or meter, consumers. The new rates which went into effect on the first of the year were an increase over the former, or old rates, of from 30 to 50 per cent to the small manufacturers, and this statement of facts was made so clear to the officials of the company that they acknowledged the same and agreed to take up the matter and rearrange the rates on a more equitable basis. The unit number of gallons per month has been reduced from 100,000 gallons to 25,000 and the price for 25,000 has been placed at $5 per month, the old rate being on a unit of 100,000 at $10 per month. This means a reduction of 50 per cent to the small consumer who rarely used 25,000 gallons. From 50,000 to 100,000, $10; 100,000 to 200,000, $17; from 200,000 to 300,000, $29; 300,000 to 400,000 gallons, $40; 400,000 gallons and upward, $50. These rates have an attached sliding scale between the limits of 50,000 and 100,000 gallons of 14c. per 1,000 gallons; between 100,000 and 200,000 gallons of 12c. per 1,000; betwen 200,000 and 300,000 gallons of 11c. per 1,000; between 300,000 and 400,000 gallons and upward of 10c. per 1,000 gallons. In regard to the domestic rates no action has yet been taken, but it is believed that quite a few changes will be made before the first of the year, so that the rates will be more uniform.

Kansas City Water Cheap

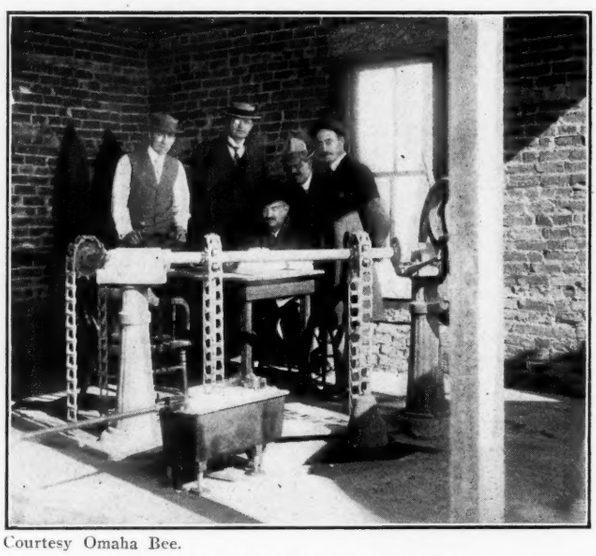
Kansas City, Mo.—Reports from several large cities show that Kansas City does as well by its manufacturers in the matter of water rates as any of them, notwithstanding the condition which requires the water to be pumped twice to serve it to the higher elevations. Industries in the West Bottoms get water from the flow line before it reaches the Turkey Creek distributing station at rates as low as 4, 5 and 6 cents a thousand gallons, better than in any of the cities heard from except Toledo, which pumps the water direct from the lake at a minimum of 3½ cents. For the high-pressure service from the Turkey Creek station Kansas City's rate ranges from 70 cents for the first 2,800 gallons—the highest consumption in a month for most domestic users—and 25 cents a thousand for the first 10,000 gallons, down to 7½ cents a thousand for a monthly consumption of 3,000,000 gallons, which is the rate of the larger manufacturers. Those using 100,000 gallons a month get a 9-cent rate. Pittsburg, a manufacturing city, has a minimum rate of 10 cents a thousand gallons for a consumption of over a million gallons a month. Cincinnati has a minimum factory rate of 10 cents; Cleveland, pumping from the lake, has a 5 1-3-cent rate a thousand gallons. The rate in St. Louis is the same as here. Buffalo has a lake service of 6 cents. Chicago, with its lake service, has a minimum manufacturers' rate of 7 cents, or ½ cent lower than Kansas City.

Water Consumption Decreased by Oiled Roads

Kingston, N. Y.—Superintendent Harrison at the annual meeting of the Board of Water Commissioners reported that he had raised reservoir No. 1 three feet and reservoir No. 4 one and one-half feet by temporary structures, thus increasing their combined storage capacity by 30,000,000 gallons. Reservoirs 1, 2 and 4 now have a total capacity equal to that of Cooper's Lake; and the entire storage capacity of the reservoir system is about 400,000,000 gallons. "The water supply is guaranteed if cared for and impounded," said President Harrison. "During the summer months 7,000,000 gallons a day are used; but owing to the use of oil on many of the roads, we do not expect the daily consumption to be so great this season."

Chlorination of Omaha Water

Omaha, Neb.—Water pumped through the Burt street station has now reached the standard of purity required by the city ordinance introduced by Councilman Berka and adopted some three weeks ago. The water company was given thirty days in which to reach a certain standard of purity, and has met the requirement. Professor Crowley,



Courtesy Omaha Bee.

WHEN THE CHEMICAL IS APPLIED

City Chemist, reported to Judge Berka a short time ago that the required standard had been reached at the Burt street station on a test just made. Fifteen months from this time a standard 25 per cent higher will be required of the water company, or the city managers.

State Health Officer Advises Dayton to Abandon Wells

Dayton, O.—In a communication to Public Service Director J. C. Ely, C. O. Probst, Secretary of the State Board of Health, recommends the abandonment of 16 of the municipality's wells, from which the public water supply is obtained in North Dayton. It is stated that the water shows slight contamination. The city officials will not likely abandon the wells now on account of a shortage.

Ozone Fails to Remove Color

Ogdensburg, N. Y.—Those who had pinned their hopes, if not their faith, on the proposition to purify the Oswegatchie water for city purposes by the use of ozone will be disappointed to learn that the engineer has owned to failure. He could not remove the color from the water, owing to its peculiar qualities, which he had never encountered in any water before. He would not install a purification plant unless he could remove the color. It had been one of his strongest points that he could change the dark fluid to a white and sparkling one. This would seem to indicate that slow sand filtration of the St. Lawrence is the only alternative left. The water of the Oswegatchie seems to be similar to that of the Black River. Watertown purifies the latter by adding chemicals, but the results are not satisfactory, and the plumbing suffers from corrosion, which occasions expense and inconvenience.

To Analyze Irvington Water

Irvington, N. J.—With a view to obtaining a thorough analysis of the town water supply the Irvington Board of Health has directed Secretary Edwin Berry to request the State Board of Health to examine it and advise the local authorities of its findings. There have been several cases of typhoid fever in the town since January and the Board is seeking to discover the causes. While the Commissioners do not attribute any of the cases to the water supply, they are anxious to learn whether it contains impurities of any nature. As a further means of discovering the cause of contagious diseases and those of typhoid fever, the Board has had cards printed for distribution among physicians practising in the town. These contain a set of queries for the doctors to answer when sending reports to the Board.

New Wells at South Bend

South Bend, Ind.—The photograph here reproduced shows the official test of the four new artesian wells at Leeper Park May 14 before members of the Board of Water Works Trustees and other city officials. At this test the wells developed a pressure indicating a flow of approximately 500,000 gallons per day for each well. On the strength of this test the Water Works Trustees awarded bids for twenty additional wells. They will be located near the site of the four finished wells. The testing of the finished wells proved to officials of the Department the theory that wells need not be scattered to be successful.

Courtesy of South Bend Tribune.

SCENE AT OFFICIAL TESTING OF WELLS

These wells were constructed at a distance of but four feet apart, while in the past wells have been sunk on an average of 100 feet distant from each other. The site for the new wells is upon a thick bed of rough artesian stratum, which was also proven by the official test to be far superior for the yielding of a water supply than the old layers of finer gravel and sand. The site for the wells was selected by the Board of Water Works Trustees with the assistance of Superintendent Thomas Ayres.

Mains Injured by Electrolysis

Houston, Tex.—In the last few months, according to the statement of Commissioner Jones, numerous water mains in different parts of the city have been damaged and in some instances entirely put out of commission by an electrolysis action on the pipes. Recently, he says, the condition instead of getting better has become worse and that in the last few weeks it has been necessary for him to replace a number of large mains in the business section, which, he asserts, have been destroyed by this underground current of electricity. Commissioner Jones has called the attention of Mayor Rice and City Electrician Clarence George to existing conditions and a thorough investigation is now under way. Just what damage has already been done it is hard to estimate, says Commissioner Jones, but recently the damage to the mains has been such that he considers something will have to be done very soon to prevent the pipe destruction, or else the city water system is liable to suffer a serious and permanent injury. It is the intention of the Water Commissioner to have the investigation as complete as possible.

Object to Cost of Pumping Station

Lockport, N. Y.—The cost of the Lockport water supply pumping station at North Tonawanda has reached a point where trouble between the Board of Aldermen and Water Commissioners may result. The power bills alone total over $1,000 each month, nearly twenty times what the city paid in the old days, when the pumping station was run by water power. The electrical pumps are so constructed that they have to be operated at full speed. As a result the city is pumping twice as much water as it needs.

Payment for Laying Water Mains

Tacoma, Wash.—The Municipal Commission is considering the feasibility of a plan to assess every lot in the city 25 cents each year for the purpose of securing a fund from which to pay the cost of laying water mains. Ever since the city first acquired the water system from the old company City Councils have wrestled with the problem of paying for water mains. Consumers have complained that it is unfair to levy a direct charge against them for the mains and then charge them again for all the water which passes through them. At the present time water mains are laid in districts. Property owners are assessed their share if they happen to be in a locality embodied in a new water district.

Put Limit on Water Franchises

Trenton, N. J.—The State Water Supply Commission has established a policy of granting limited water contracts. The first step in this direction was in the grant to the Somerset Water Company for supplying Bedminster and Bernards Townships, Somerset County. The grant is limited to thirty years, and gives the municipalities the right to acquire the company's plant on terms to be mutually agreed upon.

Delay in Hetch-Hetchy Controversy

Washington, D. C.—The Hetch-Hetchy controversy, for a season, and probably for a year or so, will be given into the hands of the Board of Army Engineers, consisting of Lieutenant-Colonel John Biddle, Lieutenant-Colonel Harry Taylor and Colonel Spencer Cosby, Secretary Ballinger ruling that the question of the capacity of Lake Eleanor and its tributaries and of the availability of other sources of supply were the primary considerations to be determined. The Board will report to him as to what time it will require and the procedure it deems advisable for a thorough probing of the engineering side of the problem.

STREET LIGHTING AND POWER

New Lights Installed

Ashland, Wis.—The current has been turned on for the new electric lights recently installed in the east end of the city, and they are giving satisfaction. There are three lights to every block and the avenues are much better lighted now than under the old gas lamp system. The work on the rest of the new lights is progressing rapidly, and Ashland will soon be an exceptionally well-lighted city.

Celebration for Light Streets

Enola, Pa.—Thursday, June 23, is the time selected for turning on the lights in Enola by the Citizens' League. A banquet will be held in honor of the occasion; also a parade, composed only of the citizens of the town and different organizations. Dr. E. C. Weirick will be chief marshal. The parade will be followed by a burlesque parade of the Darktown Fire Brigade.

Municipal Electric Plant in Good Order

Kalamazoo, Mich.—With the exception of a grounded circuit, which occurred during the severe electric storm of two weeks ago, the municipal lighting plant has recently been giving the people of Kalamazoo the best kind of service. The "ground" was caused by crossing of wires, during the high wind. Not an armature has heated in the big generators at the station since a thorough overhauling of the apparatus has been made by Superintendent Messany and his assistants.

City to Pay One-Eighth of Ornamental Lighting

Los Angeles, Cal.—One-eighth of all the ornamental lighting in the city, whether it be installed on business or residence streets, will be paid for by the city. This decision has been reached by the City Council, after several weeks of debate and postponement. Half the cost of furnishing electricity for the electroliers on the downtown sections of Broadway, Spring, Main and Hill streets has heretofore been borne by the city. The new ruling means considerable change in this ratio. One-eighth the cost of running the ornamental lights is practically the same as the city pays for the arc light system.

FIRE AND POLICE

Wants Explosive Safely Stored

Dayton, O.—Fire Chief Ramby in his inspection of buildings for the purpose of ascertaining their fire safety, may hereafter compel gasoline and oil tanks in garages and factories to be so located that it will be impossible for them to ignite neighboring articles. The Fire Chief was investigating his authority in the matter with City Solicitor Breene. In the absence of a building code the Chief's powers as Inspector of Buildings are not very clearly defined. It is probable that some sort of an ordinance empowering the Chief to regulate the location and nature of utensils for explosive and inflammable substances will be introduced before Council takes its vacation.

Civil Service a Detriment to Fire Department Efficiency

New York, N. Y.—Chief Edward F. Croker has made the charge that the personnel of the Fire Department has degenerated in recent years in consequence of the Civil Service rules. The statement was made in commenting on the conduct of the force at a fire in a bonded warehouse when two firemen were suffocated because men in charge of a hose dropped it and ran. Chief Croker has always stood opposed to the stringent present Civil Service methods as applied to prospective firemen, but his criticism of the Commission was never more bitter than it was on this occasion. "A majority of the men at that fire were young Civil Service men, and they failed to measure up to the test in that fire," said the Chief. "They couldn't stand the strain. They dropped their hose and ran. There was no excuse for the death of Healy and Cotter, and with the old force of giants that we had a score of years ago, before the present system of Civil Service enlistment became so strongly the vogue, they would not have occurred." Chief Croker, continuing, said that only about 20 per cent of the uniformed men on the scene of that fire were what they should have been physically. "A man's fire-fighting ability may be measured by his capacity to resist smoke—in a word, by his chest expansion or lung power," he said. "By the latter-day rule, the physical giants that we need so much seem to flock to the teamsters' and hucksters' unions, or to some other trade, where an educational requirement is not made. I have told the officers of the teamsters' unions several times to advise their men that the Fire Department needed bigger men; but the men whom we most desire seem to be averse to taking the mental examination." The best material of the present Department, he said, was represented in the old guard, who were recruited in the early days, and many of whom would not apply for readmission to the Department if cast out, for fear of being unable to pass the examination. He said that about all the education a man needs for good service in the Fire Department is an ability to read and write and the knowledge that orders must be obeyed, regardless of the danger, real or apparent. By way of concrete example he named a local company, which is composed almost entirely of former members of the Army and Navy, and declared that that was the best all-round group of fire-fighters in the entire Department.

To Improve Alarm System

Peoria, Ill.—What is expected to be one of the most beneficial measures ever introduced with regard to the practical workings of the fire alarm system has been formulated and will be presented to the City Council at its next meeting. The resolution provides for the changing of the entire list of fire alarm numbers from their present haphazard form to one much simplified and improved. The numbers now are arranged without sequence, and in case of a sudden changing of the alarm the result is inevitably confusion and delay which might prove costly to both life and property. The new plan provides for the use of small numbers in the business district and those above 100 for the close-lying residence districts, with still higher ones for the remoter portions of the city. With this system in use it will be impossible for the fire wagons to go far out of the way, and much benefit is expected from the change. Another innovation will be the placing of the boxes in front of public buildings in order that their location may be easily remembered by those wishing to employ them.

Fire Marshal May Be Employed

Austin, Tex.—The City Commission has passed to a second reading an ordinance providing for the employment of a Fire Marshal. The Commission is also planning to adopt a building code, and when the two ordinances are finally passed the key rate of the city's fire insurance rate will be reduced 8 cents.

Ohio Fire Marshal Wants Safe and Sane Fourth

Columbus, O.—The State Fire Marshal has sent a letter to the Mayors and Fire Chiefs in the different municipalities of the State, and a copy of an ordinance enclosed therewith, which they will be requested to have introduced in the various Councils and to urge its passage. This ordinance will prohibit the giving away or having in possession for sale or offering for sale in the various municipalities of the many kinds of fireworks and other articles for the making of a pyrotechnic display. It will provide, however, for large celebrations under proper authority and control.

Binghamton, N. Y.—Mayor John J. Irving has announced the appointment of a citizens' committee to formulate plans for a Fourth of July celebration.

Middletown, N. Y.—Middletown has enrolled itself among the cities that will have a "safe and sane" Fourth of July. The Common Council has adopted an ordinance prohibiting the sale of large firecrackers, cannons, gunpowder, caps, revolvers and blank cartridges, and, in fact, everything of a dangerous character.

Topeka, Kan.—Despite the appeal from every woman's club organization in the city and the petitions from others interested, Topeka will have an open Fourth of July this year. It is the opinion of the City Commissioners that the State laws and the existing conditions among the Topeka merchants make it impossible to place a muffler on the usual Fourth of July celebrations.

St. Paul, Minn.—Eighty members of the St. Paul Commercial Club, in committees of two each, are at work among the merchants to raise by popular subscription the $2,000 needed to carry through the safe and sane Fourth of July entertainment at Harriet Island for the children of the city. The "safe and sane" committee is at present working on the Fourth of July program. In many respects it will be similar to that of last year, though on a more pretentious scale. The aim is to provide an entertainment of such excellence that the children of St. Paul will flock to Harriet Island and forget the allurements of the "unsafe and insane" Fourths of the past.

GOVERNMENT AND FINANCE

Chicago Receives Low and Pays High Interest

Chicago, Ill.—Chicago, with a cash balance of close to $20,000,000 on hand, has succeeded in getting a reduction of $950 in the discount which it is forced to pay to float a $500,000 issue of three-year 4½ per cent bonds, dated July 1. The city's deposits in its vaults and various banks amount to $19,995,616.91, the largest amount of cash it has ever had on hand. On that it receives 2 per cent interest. It offered 4½ per cent interest to borrow $500,000 by selling bonds, but only four applicants appeared when bids were opened last week, and the best offer asked an immediate payment of $4,700 in addition to the annual interest as a discount or commission for taking the bonds. This came from William A. Read & Co. The other bidders were Lee, Higginson & Co., the Harris Trust and Savings Bank and N. W. Halsey & Co. Contrary to the usual policy, Walter H. Wilson, City Comptroller, did not immediately award the issue to the lowest bidder. After a conference with his deputy, Louis E. Gosselin, he decided to wait and several offers were received from Eastern financial houses, but none on acceptable terms. The situation was solved when William A. Read & Co. agreed to reduce the discount from $4,700 to $3,750, making a reduction of $950. It means that the bond house will get $500,000 of bonds for which the city pays 4½ per cent interest annually for $496,250. It also means that instead of paying 4½ per cent the city is actually paying 4¾ per cent. The city needs the money for running expenses and the law prohibits it from using its large cash fund or from investing in its own securities.

Income from Municipal Industries

Denver, Col.—The revenues and earnings from municipal industries and investments in 1909, according to the report of the City Auditor, was: Auditorium, $23,474.46; Bureau of Survey, $5,657.15; City Market, $12,047; Globeville Water, $4,453.54; Highway Department, $1,994.25; interest, bank balances, $11,010.88; paving repairs, $11,454.91; rentals city property, $10,120.56; Steele Hospital, $1,734.19; total, $81,946.94.

Auditor Adopts Timekeeping Clock

Kansas City, Mo.—City Auditor Arthur F. Brodie has just put in his office an automatic timekeeping clock, at which his clerks must register when they begin and leave off work. It is said that similar clocks will be put in the other departments.

Mankato Commission Will Study Commission Plan

Mankato, Minn.—The newly elected Commission will probably go to Des Moines and Cedar Rapids, Ia., to take a few lessons in the commission form of government as exemplified there to find what experience has taught those cities. They will probably spend several days informing themselves on how best to perform their duties.

STREET CLEANING AND REFUSE DISPOSAL

Cleveland Wants 100,000 Garbage Cans

Cleveland, O.—In the opinion of Public Service Director A. B. Lea, there should be 100,000 garbage cans to enable the Garbage Department to give the city the most efficient service possible and to collect all garbage. "We have knowledge of about 50,000," he said. "There should be 100,000. If each household were provided with a garbage can it would enable us to collect all of the city's garbage."

Screens Added to All City Garbage Wagons

Knoxville, Tenn.—An improvement in the city Street Cleaning and Sanitary Department is the recent equipment of all garbage carts with screens, covering the loads of trash. It is an improvement which has been needed for some time, as a number of complaints have been made of trash, waste paper, etc., being scattered on the streets while en route to garbage piles. The screens were added at the suggestion of Chairman John W. Flenniken of the Board of Public Works, and the experiment has proven a success in every particular.

Vacant Lots Will Not Be Taxed for Street Sprinkling

Natchez, Miss.—According to a report by the Street Sprinkling Committee to the Board of Aldermen, a total of 16,798 front feet will be eliminated from the sprinkling district on account of vacant lots. As an offset 3,914 front feet will be added by new sections, but the net reduction of 12,884, or an increase of $1,623.55 in the cost, to be paid by residential and business properties. The City Solicitor stated that the Massachusetts courts decided that the tax is for an improvement, and street sprinkling is not an improvement to vacant lots. Therefore, the vacant lots should not be taxed.

More Sprinkling Wagons Needed

Rochester, N. Y.—The condition of the city streets was brought up by Councilman Hackett. Many complaints have been made in regard to the dust. On most streets it is inches thick and rises in an impalpable cloud at the passage of every vehicle and then settles gently over everything. "The streets are a disgrace," said Mr. Hackett. "It isn't the fault of the Superintendent of Streets, for he hasn't the tools to work with. I make a motion that we buy him some more sprinkling wagons." Councilman Cisney began to figure up the cost, for six wagons meant twelve fat horses and six sets of double harness besides the pay of the men to drive the wagons. A sprinkling wagon costs about $1,200 and a good team $400, while the harness costs $75 more. "I don't care what it costs," said Mr. Hackett; "let's buy them anyway and get rid of this awful dust. If we can't pay for them we can take up a popular subscription, the way they do when they want to build a bridge or a hotel."

Mayor Compliments Commissioner of Street Cleaning

New York, N. Y.—Mayor W. J. Gaynor has sent the following letter to the Commissioner of Street Cleaning:

June 6, 1910.

Dear Mr. Edwards:—

I feel that I ought to formally compliment and thank you and your borough deputies and all of the officers and men of your department on the splendid showing made by your parade last Friday. It surprised me. It made manifest to all of us the spirit of ambition and pride which all of you have in being employed in the city's service. Very truly yours,

W. J. GAYNOR, Mayor.

William H. Edwards, Esq.,
Commissioner of Street Cleaning.

Pasadena Gathers Nearly All Garbage

Pasadena, Cal.—That the city now gathers about three-fourths of the garbage is the estimate of city officials. The system was inaugurated last year, after the deficiencies or the lack of system then prevailing had been shown. There are still some poultry raisers who have garbage routes, and gather the table scraps to feed to their birds. The city does not interfere with these, except to make sure that they do their work properly. Some people feed their garbage to their own chickens. Apart from this, however, the municipal wagons now cover the entire city, making collections two, three or four times a week, or every day, as conditions necessitate.

RAPID TRANSIT

Initiative Ordinance for Car Fenders

Berkeley, Cal.—It would appear that the efficacy of the initiative provided for in the new charter of Berkeley is about to be tested out. Attorney J. O. Davis, who with many other citizens and members of the Berkeley Improvement Clubs, has been endeavoring to have the City Council enact an ordinance compelling the traction company operating in the city to install adequate life-saving fenders, began the circulation of a petition to which signatures are sought for the purpose of forcing the Council to take action. The ordinance proposed by the Berkeley Council is said to have met the approval of the Councils of the cities of Oakland and Alameda, and joint action in the matter is expected. The citizens declare that the Council should not permit the traction company so much leeway in the selection of a fender. They declare that the latitude allowed the company will permit of the installation of a mere "wheel-guard" in lieu of a proper life-saving device.

No-Seat-No-Fare Invalid

Cincinnati, O.—City Solicitor Ballard has sent to City Council an opinion that the so-called "no-seat-no-fare" ordinance aimed at the traction company would be invalid if enacted. He states that under the proposed law the traction company would be compelled to haul people who are standing free of charge and that such cannot be done. The franchise allows the company 5 cents for each passenger. He holds that any regulation of the traction company regarding seats might come under police powers, but that police powers did not contemplate any authority to reduce fares. The movement in favor of a no-seat-no-fare ordinance has been earnestly backed by labor organizations.

Would Have City Maintain Street Car Terminal

Dallas, Tex.—William J. Moroney has suggested to the Commissioners that the city construct loop tracks in a central location for the use of street cars. The street car "loop" and its approaches should be utilized to aid in providing and maintaining an "open door" for all local suburban and interurban lines, the tracks to be used by all companies on terms of absolute equality, on the payment of just compensation, to be fixed by the Commission or other public authority, and without reference to the consent of any private corporations or individuals, but subject only to uniform rules to be prescribed by public authority.

Real Estate Companies Provide Rapid Transit

Spokane, Wash.—A gasoline car has been put in operation in the Hollywood addition. Similar cars will be introduced by all land companies promoting additions beyond the car limits. All that is required is a single track and the car will run back and forth to connect with the regular car lines.

MISCELLANEOUS

City May Rent Its Autos

Cleveland, O.—Every service department automobile owned by the city may be disposed of and the plan adopted of entering into a contract with some automobile concern for the rental of machines by the hour when needed. This plan is followed in Chicago, where the city government is charged $2 per hour for the use of automobiles. Mayor Baehr is considering the scheme and some decision may be reached in a few days. If the plan is followed bids on this service will be called for and the contract for a year will be awarded to the low bidder. Public Service Director Lea believes that the expense of maintenance and chauffeur hire is too great, under the present system. The city has two garages on Rockwell avenue, Northeast, at present.

Urges a City-Wide Number Plan

Chicago, Ill.—The house numbering system is to be applied to the entire city May 1, 1911, if a recommendation of the Council Committee on Street Nomenclature, Alderman Jacob A. Hey, Chairman, is approved by the Council. This will give business houses in the district bounded by the main and south branches of the river and by Twelfth street eleven months in which to anticipate the law's order. All other portions of the city are under the system by which numbering begins with No. 1 at the intersection of State and Madison streets and increases by 800 for each mile from these base-line streets. E. C. Ferguson, of the Chicago Association of Commerce, supported the plan. Data were also produced by John D. Riley, Superintendent of the Map Bureau, to show that the change will not produce the confusion which has been feared, as few of the big business houses or office buildings now use a number when giving their street address. When it takes effect all portions of streets will have the prefix East, West, North or South, according to the side of State or Madison street on which they are situated.

Can a Tent Be a Building?

Hutchinson, Kan.—H. J. Walters, who recently started an ice cream cone stand on South Main street near the Crawford Airdore, is having trouble with the city fire ordinance. When he started the stand several days ago he was informed by the Chief of Police and the Fire Marshal that he was all right. Since that, however, the town officials looked up the ordinance and, believing that a tent such as he was erecting was not in accordance with the law in the case, ordered him to move away. It seems that the point at issue is whether or not a tent is a building. The ordinance as expressed says that no building not made of brick, stone or cement shall be erected inside the fire limits. Police Judge Campbell will decide the knotty point.

Ask Municipal Dance Hall

New York, N. Y.—On the theory that if they are offered clean and wholesome recreation, under watchful eyes, and guarded from evil, the opportunities for young girls going astray will be greatly lessened, Mayor Gaynor and the city authorities will be asked to establish a public dancing hall, to be conducted by the city for the benefit of young people living in the congested district.

Spokane Spending Millions for Improvements

Spokane, Wash.—Mayor Nelson S. Pratt is authority for the statement that Spokane is spending more money for public improvement than any other city of its size on the continent. He announces that more than $5,000,000 will be expended on bridge and street work this year, also that it is likely it will be near the $7,000,000 mark in 1911. It is also given out that building construction work this year will involve a total expenditure of not less than $9,000,000. One of the city contracts is for ten miles of paving in a residential district, the work costing $512,000, while in another part of the city the improvements cost $400,000, other work in hand, bringing the amount to $1,225,000. The city is also building a concrete bridge to cost between $400,000 and $450,000, over the Spokane River near the falls. Another contract, upon which work will begin probably in June, calls for $181,500.

Interesting History of City Playgrounds

Rochester, N. Y.—Benjamin B. Chace, president of the Children's Playground League, has written a little pamphlet entitled "An Evolution," in which he tells the story of the growth of the playground movement in Rochester. The information has been distributed among the delegates of the Playground Congress, which was just held in Rochester. After seven years of work on the movement, Mr. Chace says the results may be summarized as follows:

First—The playground at Brown Square now under the Park Board.
Second—The playground at School 26 now under the Park Board.
Third—The playground at School 14 now under the School Board.
Fourth—The playground at School 36 now under the School Board.
Fifth—The $50,000 playground and bath at School 9 under the School Board.
Sixth—The Hartford Street playground (Italian) under the Park Board.
Seventh—The playground and athletic fields in the park system.
Eighth—The annual appropriation for maintenance of playgrounds by the School and Park Boards.
Ninth—The charter amendment relating to future play centers and their control by the Common Council, and the Board of Education, respectively.

Tree-Trimming Ordinance

Topeka, Kan.—The Board of City Commissioners has passed a tree-trimming ordinance, which follows:

It is hereby made the duty of the owner of any premises abutting on any street or avenue of this city to cut and trim all trees or shrubbery growing in the parkings between the sidewalks and driveways of the streets and avenues and all trees or shrubbery growing on any part of said premises and adjacent to the sidewalks, streets or avenues, in such manner that the boughs or limbs thereof shall not obstruct free and convenient travel along the sidewalks, streets and avenues; and shall not obstruct the passage of light from the electric street lamp; and when said premises shall be occupied by some other person than the owner, it shall be the duty of the said occupant to cut and trim the trees and shrubbery in the same manner hereintofore required of the owner; said cutting and trimming shall be done under the supervision and direction and to the satisfaction of the Commissioner of Water Works and Street Lighting and the Commissioner of Parks and Public Improvements. Any occupant or owner who shall refuse or neglect to cut and trim trees and shrubbery as hereintofore provided after receiving five days' notice from the city authorities to do so shall be deemed guilty of a misdemeanor and upon conviction thereof fined not less than $3 and more than $25.

Phœnixville Has Shade Tree Commission

Phœnixville, Pa.—Council has named a commission of three to look after the shade trees of the town and have them planted in streets that now have none.

San Diego's Civic Beauty Plans

San Diego, Cal.—This city plans to lay out a civic center by pulling down five blocks and arranging thereon around an open space a City Hall, a court house, a post office and an opera house; the construction of a mile or more of sea wall, behind which are arranged a planted strip, a promenade, a driving way, a railway and a new facade to the town; the improvement of the stations, by their reconstruction with open spaces in the front; to pull down the buildings between two parallel streets connecting the City Park and the sea front, and to convert the space into a planted boulevard or "Pasea"; to provide other open spaces, certain new streets and a park system.

City to Tax Billboards

Omaha, Neb.—An occupation tax of 2 per cent on gross receipts is to be levied on companies maintaining billboards and operating bill-distributing agencies in Omaha, the Committee of the Whole of the City Council having decided on this figure as about right, and recommended for passage an ordinance embodying the tax, as well as providing for a license fee of $25. The business of the companies located in Omaha amounts to about $40,000 a year gross, with a profit of between $4,000 and $5,000.

Lower Telephone Rates and Better Water Pressure Sought

South Denver, Col.—Lower telephone rates and better water pressure are the objects to be sought by two committees of the South Denver Improvement Association. Resolutions were adopted at a recent meeting setting forth that the telephone company is operating without a franchise and using the streets of South Denver, especially, without a grant from the people. Moreover, the resolutions declare that the charges for service are excessive. A committee consisting of Lorin S. Whitney, J. Harry Rose and Prof. W. J. Wise was named to confer with the telephone company regarding a reduction in South Denver rates, and also to present a petition to the Mayor, City Attorney and both branches of the City Council, requesting them to compel the company to apply for a franchise.

LEGAL NEWS

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

City Must Supply Water

City of Camilla vs. Norris.—The charter of a municipality conferred upon it the power "to own, use and operate, for municipal purposes and for profit, a system of water works and electric lights, to make rules and regulations regarding the use of the same by the public, and to provide by ordinance for the punishment for those who illegally use said water or light." A resident of the city filed a petition for mandamus to compel the municipal authorities to supply water at her residence. It was alleged that the municipality had established a water system, with which the applicant's residence was connected, and was serving the public generally, but without cause had stopped applicant's supply of water and refused to serve her, although she was due nothing for water rent, and tender of payment in advance was made for the service desired. Held, that the petition was not subject to dismissal on the ground that the plaintiff had a specific legal remedy.—Supreme Court of Georgia, 67 S. E. R., 940.

Supply of Water by Company

Lowe vs. Yolo County Consolidated Water Company.—Though a water company is not liable for failure to deliver water to an applicant where there are prior applicants for all its water, refusal to allow it to show there were prior applicants, who were supplied, is harmless; the uncontradicted evidence showing that, after supplying them, there was sufficient water running to waste to supply the later applicant. A corporation may, because of the acts of those whom it has placed in charge of its affairs, be held guilty of malice or oppression, making it liable, under Civil Code, for exemplary damages.—Supreme Court of California, 108 P. R., 297.

Improvement Assessment—Authority of Council

Houck et al. vs. City of Roseburg et al.—Where, under Laws 1895, the proceedings necessary to the jurisdiction of a City Council in constructing a sewer are the declaration by ordinance whether the cost thereof shall be assessed to the property directly benefited, the appointment by the Council of disinterested viewers to view the street and location of the sewer and determine what property is directly benefited thereby, and the extent and proportion of such benefit, the failure of the viewers to assess all the property jointly benefited is not jurisdictional. In a suit to enjoin the collection of a sewer assessment brought by a property owner benefited by the improvement, because other property owners on the other side of the street who were also benefited were not assessed, the findings of the Council as to the amount of property which was directly benefited and the proportionate share thereof to be charged to each lot are conclusive in the absence of fraud.—Supreme Court of Oregon, 108 P. R., 186.

Delinquent Assessment—Sale of Land

United Real Estate and Trust Company vs. Barnes, Superintendent of Streets.—An appeal from a judgment dismissing a suit to enjoin the sale of land for a delinquent assessment taken after payment under protest to avoid a sale will not be dismissed as presenting a moot question, the questions whether on the reversal of the judgment the Superior Court may under its equity powers order a refund of the money paid under protest, and as to the liability of the sureties on the undertaking on the issuance of the temporary injunction, involve the merits.—Supreme Court of California, 108 P. R., 306.

Injury to Property—Equitable Relief

Hanley vs. City of Medford et al.—Where, by a void judgment, a city has condemned land, and is threatening to enter on the land and dig a ditch thereon by virtue thereof, equity has jurisdiction to restrain action under such judgment, though it is void, since there is a cloud on the title to the property and a threatened trespass.—Supreme Court of Oregon, 108 P. R., 188.

Streets Vacation—Rights of Property Owner

Crowell et al. vs. City of Monroe.—The matter of the vacation or closing of streets being committed by the charter of the city of Monroe (Privy Laws 1899) to its authorities, the courts will not interfere with the exercise of such discretion, and the closing of a railroad crossing in order that an overhead bridge immediately above the crossing might be erected for public safety and convenience did not entitle a property owner inconvenienced and temporarily damaged thereby to damages. The closing by a city of a street crossing railroad tracks did not constitute a taking of private property for public use, and, in the absence of express statutory law decreeing compensation, none could be recovered by a property owner affected thereby.—Supreme Court of North Carolina, 67 S. E. R., 989.

Right of Veteran to Hold City Office

Williams vs. Darling et al.—Relator, a veteran of the Civil War, was appointed to the office of Superintendent of Streets and City Property in 1903 to fill an unexpired term which terminated in 1905. He held such position until January 1, 1908, when he was reappointed for the term of two years ending on the 31st day of December, 1909, when respondent C was appointed in his place. Civil Service Law, section 22, provides that a veteran shall not be removed except for incompetency or misconduct. Held, that the purpose of section 22 was to prevent the summary removal of a veteran who was holding under appointment for an indefinite term, and that the Civil Service law could not extend the term of an appointment made for a definite statutory period, and that relator's right to the office expired on December 31, 1909.—Supreme Court of New York, 122 N. Y. S., 534.

Municipal Indebtedness—Constitutional Limitations

Evans et al. vs. Holman et al.—Where a village acquired an electric light plant for $11,496 by issuing $4,200 of bonds, which was the constitutional limit of indebtedness, subject to the payment of a mortgage indebtedness on the plant of $7,296, as it matured, and taxpayers made no objection to the purchase of the plant nor to the issuance of the bonds by the vendor, but merely sought to prevent the payment of any price above $4,200 ,and the officers of the village insisted that the transaction was legal and that the income of the plant would pay for itself, the court could only enjoin the payment of the mortgage indebtedness except out of the net income of the plant after paying operating expenses and necessary repairs. A municipality does not create an indebtedness by obtaining property to be paid for wholly out of the income thereof. An agreement by a village to pay a specified sum annually for arc lights during a specified period constitutes an indebtedness for the whole amount, and is illegal if exceeding the constitutional limit.—Supreme Court of Illinois, 91 N. E. R., 723.

Acquisition of Real Estate for City Hall

Niles Bryant School of Piano Tuning vs. Bailey, Mayor.—Under the charter of a city, authorizing it to purchase and hold real estate for corporate purposes, and providing for the payment of any indebtedness by taxation or by issuing bonds, a city purchasing a City Hall site must provide for the payment of the price, either by taxation or by issuing bonds therefor, and where that is not done, and no valid appropriation has been made for the purpose, a warrant for the price is unlawful.—Supreme Court of Michigan, 126 N. W. R., 116.

Building Permit Improperly Refused

City of San Antonio et al. vs. Salvation Army.—A city, having no power under its charter to prescribe limits for the erection of buildings for harboring vagrants, has no power to pass an ordinance to prohibit the erection of rescue homes for fallen women within a specified distance of a public park, church, school, or other institution of learning or orphan asylum. Where one contemplating the erection of a building in a city complied with the ordinances as to obtaining a building permit, and the permit was refused, the municipality could not insist that he must have a permit before he can build.—Court of Civil Appeals of Texas, 127 S. W. R., 860.

NEWS OF THE SOCIETIES

American Highway League.—At the first meeting of the association, Chicago, Ill., May 13-14, President A. N. Johnson stated the object of the league. About a year ago the representatives from the State Highway Departments of Minnesota, Wisconsin, Iowa, Missouri and Illinois met in Springfield and formed what may be termed a tentative organization. The constitution and by-laws that were drawn up provided for a State membership—that is, an association whose membership is not composed of individuals but is composed of the State Highway Departments, each State to be a unit, which is the fundamental idea of the constitution as drawn. Thus if there were any question of moment that should come before the association the vote thereon would be taken by States by letter ballot, the idea being that only an expression of opinion could be obtained from the voting of the individuals present at a meeting, but that the official expression of the organization would be by the vote of the States, each State department to take into consultation whom it pleased. There has been in this country, Mr. Johnson said, no opportunity before this to get together and discuss these matters technically. At the road conventions that have been held such discussions are necessarily impossible; they were held to arouse public interest and they served their purpose. At the enginering societies, it was said, it has been almost impossible to hold technical discussions of road work for the simple reason that there have been so very few technical men at any of the meetings who were especially interested or had actual experience in highway work. Mr. Johnson said his own experience before one of the large engineering societies of the country was sufficient to demonstrate these facts. Mr. Johnson presented a paper and there was but one man present who attempted to offer any intelligent discussion on the subject.

The following State Highway Departments were present: Pennsylvania, Maryland, Wisconsin, Minnesota, Michigan, Iowa, Missouri, Kansas and Illinois, and letters were received from all the other departments expressing their approval of the purposes of the meeting and regretting that the condition of their work would not permit attendance at this time. The officers elected were A. N. Johnson, Springfield, Ill., chairman of the Governing Council, and Thomas H. MacDonald, Ames, Ia., secretary-treasurer. The important features of the meeting were an exhaustive discussion of macadam construction. Methods of road administration were also discussed. An inspection trip was made to the Joliet convict quarry, where all details of the operation of the quarry could be viewed. The chairman was authorized to appoint a committee to draw up standard specifications for highway bridges. Action was taken to encourage each department to present to the American Society of Civil Engineers all data concerning bituminous macadam construction, the object being to have as uniform data collected as possible.

The following constitution was adopted:

Name

Section 1. The name of this association shall be the American Highway League.

Objects

Section 2. To encourage highway improvement.

To provide for effective co-operation between state highway departments and other state and Federal departments interested in road work.

To study and recommend methods of highway construction, and maintenance and administration.

To study and propose methods for the distribution of the cost of highway construction and maintenance.

To provide a channel for the official recognition of matters pertaining to highway work.

To discourage projects that pervert the public interest in better highways.

Membership

Section 3. The membership shall be composed of state highway departments.

Officers

Section 4. There shall be a governing council, which shall be composed of state highway commissioners, state highway engineers and executive heads of state highway departments. Any such state official shall become a member of the governing council on his own initiative, as expressed in writing to the secretary of the council.

There shall be a chairman and secretary-treasurer of the council elected annually, whose duties shall be those usually entrusted to such officers and such additional duties as the council may from time to time indicate. In the election of the chairman and secretary-treasurer of the council each state shall have one vote.

Voting Power

Section 5. All resolutions and business that comes before the League for action shall be passed upon by the council, each state to have one vote, the members of the governing council from a given state to decide how the vote for that state shall be cast. The decision of the League on any matter shall be governed by a majority vote of all the states in the League. This may be done by a letter ballot addressed to the secretary of the council.

Meetings

Section 6. Meetings of the League and governing council shall be held once in each year in the month of January, the time and place to be fixed by the governing council. Special meetings may be held on the call of the chairman.

Dues

Section 7. The entrance fee for each state joining the association shall be $25.00, which amount shall cover dues for the current year. Thereafter the dues shall be $15.00 per year.

American Society for Testing Materials.—Among the papers to be presented at the thirteenth annual meeting, Atlantic City, N. J., June 28 to July 2, inclusive, are the following: "Standard Specifications for Cast Iron and Finished Castings," Walter Wood, chairman; "Standard Methods of Testing," Gaetano Lanza, chairman; Committee Reports on "Standard Specifications for Steel," William R. Webster, chairman; Committee Reports on "Standard Specifications for Cement," George F. Swain, chairman; "Preservative Coatings for Structural Materials," S. S. Voorhees, chairman; "Corrosion of Iron and Steel," A. S. Cushman, chairman; "Standard Tests for Lubricants," A. H. Gill, chairman; "The Effect of Sodium Silicate Mixed with or Applied to Concrete," Albert Moyer; "The Painting of Cement and Concrete Structures," Charles MacNicho; Committee Reports on "Waterproofing Materials," W. A. Aiken, chairman; "The Determination of Soluble Bitumen," Prévost Hubbard and C. S. Reeve; "Improved Instruments for the Physical Testing of Bituminous Materials," Herbert Abraham; "Necessary Reforms in Specifications for Petroleum Products," Albert Sommer; "A New Machine for Testing Pitch," T. V. Olsen; Committee Reports on "Standard Specifications for Paving and Building Brick," L. W. Page; "Standard Tests for Road Materials," L. W. Page, chairman; "Standard Specifications for Vitrified Clay and Cement Sewer Pipe," Rudolph Hering, chairman. Nominations of officers for the ensuing term have been announced by the executive committee as follows: President, Henry M. Howe; vice-president, R. W. Lesley; secretary-treasurer, Edgar W. Marbury; member of executive committee, James Christie.

Minneapolis Civic Commission.—Reporting on his general survey of present conditions and prospective growth in Minneapolis, E. H. Bennett, of Chicago, civic architect, appeared before the Minneapolis Civic Commission, of which he is consulting architect, at a luncheon at the Minneapolis Club last week. Mr. Bennett told the Commission what he had seen and he sketched out the scheme of the further data he needed to formulate a comprehensive plan for the future improvement of the city. Some idea of the exhaustive nature of the preliminary survey is given by the part of it assigned to W. P. Cowles, resident engineer of the Commission. He is charged with ascertaining the "center of gravity" of the manufacturing, wholesale, retail, railway and resident districts of the city, as well as its center of population. Mr. Cowles must also find where they were ten years ago. From these and other data it is supposed that the direction of future extensions can be figured out. The Commission aims to prepare a plan which shall cover all contingencies of the building development of the city. In line with this policy it has prepared and forwarded to the Secretary of the Treasury resolutions endorsed by the Commercial Club, the Publicity Club and other civic organizations, asking that action on the plans for the new post office be held in abeyance until the announcement of Mr. Bennett's plan on December 1.

Texas Commercial Secretaries' Association.—The association is having road models made from the actual materials designated and united by an adhesive to keep in place, showing at a glance how each particular style of road is made and how differing from other forms—a short kindergarten course in modern road-making without words. These models will be exhibited by the association at many points in the State at the fall fairs and at various lectures, conventions, exhibitions and various gatherings, while at the State Fair at Dallas someone will be present with the models to discuss and explain any problems of road-making not properly understood, and to strongly advocate and recommend the great value of good roads in any State or section for its agricultural, industrial, social and even intellectual upbuilding, and that good-road investment is simply another way of saying good-paying investment.

Institution of Civil Engineers.—The site of the present home of the institution, at 25 Great George street, Westminster, is now required for the extension of the offices of the British Government. New premises have been obtained with frontages on Great George street and Princess street, and occupying an area of 21,000 square feet, considerably larger than the older site. The building which is soon to be erected on the new site has been designed by Mr. James Miller. The institution has occupied premises at 25 Great George street since 1838, but the present building was erected in 1896.

Louisiana State Firemen's Association.—The following officers were chosen for the ensuing year: James B Heaney, New Orleans, president; F. V. Mouton, Lafayette, vice-president; W. J. Kleimpeter, Gretna, re-elected secretary; William Holmes, Alexandria, re-elected treasurer; Charles A. Reviere, Thibodaux, statistician; F. V. Mouton, Lafayette, delegate to National Convention; Chief Charles O'Brien, Shreveport, delegate to the International Engineers' Association Convention. Covington was chosen for the next meeting.

National Association of Comptrollers and Accounting Officers.—Fiscal officials from fifty-three cities and towns, members of the national association, began their fifth annual convention at the Hotel Astor, New York, June 9. The municipal financiers represent, broadly, the whole United States, since they are here from the Gulf of Mexico to Minnesota, and from New York to California. Formerly the annual conventions were made up almost entirely of the financial officials of large cities, but this year many small towns and some counties were represented The principal object, the one which occupied the most attention at the convention, was the promotion of a uniform classification of city accounts on the standard adopted by the United States Census Bureau. The association wants all cities to adopt the same system of bookkeeping; to adopt uniform methods of financing in the classification of their budgets; uniform methods of levying taxes; uniform methods of accounting for miscellaneous revenues, and in the distinction between general revenues and moneys borrowed on a city's credit.

Alonzo Tweedale, Auditor of the District of Columbia, who is president of the association, in his opening address said:

Considering the general business of the cities as it was reported eight years ago, and the uniformity that now exists in the annual reports of a large number of the principal cities, and the modern business and financial methods that have been introduced, it seems well nigh incredible that such progress could have been made in so short a time. For this improvement most of the credit should be given to Dr. LeGrand Powers, Chief Statistician of the Census Bureau.

The most important factor in the regulation of city finance is found in the annual budget. It is at this point in the city's business that the greatest activity should be exercised to obtain uniformity, for, if the budgets of cities are framed along uniform lines, then all of the resulting financial work of the city will follow in logical sequence the uniformity obtained in the original financial proposal adopted by the governing authorities. A budget constructed along scientific lines reduces all the business of a city to a few general heads, subdivided according to departments or functions under the general head.

Harvey S. Chase, Boston, Mass., read a paper on "The Practical Application of Modern Methods of Accounting to Municipalities." Louis S. Betz, ex-Comptroller of St. Paul, Minn., read a paper advocating the adoption of uniform classification in making up budgets. Mr. Betz also said that he was wholly in favor of having in cities a committee or set of officials to make up the budgets who would be entirely distinct from the officials who spend the money. He said those who spent the money, in his judgment, should have nothing to do with the making up of the budget. He also declared that he was in favor of making it a misdemeanor for a city official to spend more money than provided for in the budget.

The discussion becoming general, several Comptrollers thought it practically impossible at the present time for all cities to have the uniform accounting system advocated. Edward Stetson Griffing, of New Rochelle, was one of these. He said no two Comptrollers used the same language in speaking of financial transactions, or regarded accounts in exactly the same way. He thought if every Comptroller interested in the movement would send to every other Comptroller in the country a copy of his annual report it would be helpful. He suggested that Comptrollers incorporate in their reports the population of their cities, the per capita expenditures, and the proportion of the total expense that each department bears. "When this interchange of reports has been made for a few years," said the speaker, "and we have each adopted the best features of our neighbor's report and have come to a common mode of expression in making up our reports, then it may be possible to adopt a uniform classification for our budgets." Duncan MacInnes, of New York City's Finance Department, said the association would have to settle upon some basic principles of classification before a uniform system could be adopted. Dr. Francis Cleveland, of the National Municipal League, explaining to the association the purposes of his organization, said it was formed in order to bring closer together the city government and the citizen with mutual advantages to both. Lewis K. Rockefeller, of the State Comptroller's office, Albany, N. Y., spoke of the relations of the State and city departments. He pleased the audience by saying he thought that Comptrollers generally were not paid sufficient salaries. These officers were elected for the ensuing year: President, Alonzo Tweedale, Washington, D. C.; vice-president, Edmund D. Fisher, New York; secretary, George A. Rex, Pawtucket, R. I.; treasurer, Samuel Wilhite, Louisville, Ky. The convention next year will be held at Birmingham, Ala.

North Carolina Municipal Association.—About twenty towns and cities were represented at the second annual convention of the association held at Winston-Salem June 3. Secretary Thomas D. Meares, Wilmington, called the meeting to order and requested Vice-President W. D. Laroque, Kinston, to occupy the chair. Mayor O. B. Eaton delivered the address of welcome. Mayor J. W. Hawkins delivered an address on "Economical Co-ordination of Municipal and County Governments." Dr. L. S. Lumsden, United States Public Health and Marine Hospital Service, read a paper on the "Prevention of Typhoid Fever." A resolution was passed requesting the Legislature to enact a law permitting all cities by popular vote to adopt the commission form of government. Mayor Tate read a paper on "Experiences of High Point with the Commission Form of Government."

The following officers were elected: President, Mr. F. N. Tate, of High Point; first vice-president, Captain J. D. McNeil, of Fayetteville; second vice-president, T. W. Hawkins, of Charlotte; third vice-president, O. B. Eaton, of Winston; fourth vice-president, J. Wynne, of Raleigh; fifth vice-president, W. D. Laroque, Jr., of Kinston; sixth vice-president, Walter G. McRae, of Wilmington; secretary and treasurer, Thomas D. Meares, of Wilmington. Raleigh was selected as the next meeting place.

New York Mayors.—Mayor Edward Schoeneck, of Syracuse, has been invited to preside at the conference of Mayors of Second and Third-Class Cities of the State, to be held in Schenectady June 23 and 24. The head of every municipality in the State of the second and third class has expressed an intention of attending, and eminent students of municipal subjects from this and other States have accepted invitations to address the conference. It will deal with topics of vital interest in the government of cities, principally with matters of public health. Aside from the Mayors the heads of departments from many municipalities will be present. Mayor C. C. Duryee, of Schenectady, has charge of arrangements.

Virginia State Volunteer Firemen's Association.—Several hundred Volunteer Firemen representing all parts of the State are expected to attend the twenty-fourth annual convention at Alexandria August 24, 25 and 26, and committees delegated by the various firemen's organizations are busy making preparations for their entertainment. The general committee has announced the following programme:

Wednesday, Aug. 24, 6 a. m. to 10 p. m.—Reception of delegates and visiting companies; 2 p. m., opening session of the Virginia State Firemen's Convention at the Opera House. Address of welcome by Representative C. C. Carlin, on behalf of the city, and J. H. Trimmer on behalf of the firemen of Alexandria; 8 p. m., evening session of the convention.

Thursday, Aug. 25.—1.30 p. m., grand parade of firemen; 8 p. m., band concert, corner of Washington and King streets.

Friday, August 26.—10 a. m., horse races and other contests for prizes..

Prizes for Parade.—Thursday, Aug. 25, first prize, largest and best appearing uniform company in line, with band, member of association, $100; second prize, largest and best appearing uniformed company in parade, with band, member of association, $50; third, largest and best appearing uniformed company in line, without band, member of association, $25; fourth, largest and best appearing uniformed company in line, out of State companies, $25; band contest, open to all bands with visiting fire companies, prize $50.

Friday, Aug. 26.—Horse race, first prize (State Association companies only) custody of State Association trumpet, $100; second (State Association companies) $50; first prize (open to all), $100; second (open to all), $50.

South Carolina State Firemen's Association.—Sumter will be thronged with people June 21, 22 and 23, the days when the fire fighters hold full sway. Louis Behrens, of Charleston, Chief of the Charleston Department, and president of the association, is urging all the organizations to enter the tournament and to have representations at the convention, and Chief Behrens has assured Chief Hood, of Sumter, that the Charleston Department will be well represented. Chief Behrens will also send to Sumter his Pompier Corps to give an exhibition. Automobiles will be an attractive feature of the week.

Western New York Volunteer Firemen's Association.—The annual convention, to be held at Lockport July 26 and 27, will be one of the greatest in the history of the association. The meeting will be held during the old home week celebration at Lockport, and the committee in charge of the week's programme has set aside those two days for the firemen. The business sessions will be held in Hodge Opera House and the closing meeting will be followed by a banquet at Prospect Hall. Various forms of entertainment will follow the banquet. About seventy-five organizations will march in the parade. Charles F. Foley, secretary of the association, has arranged competitive drills to follow the parade. One of the drills will be a hand-engine contest between Buffalo, Niagara Falls and Rochester companies. Hose, hook and ladder and rub-and-hub races will complete the programme. The winner of each contest will be given a prize.

International Association of Municipal Electricians.—The fifteenth annual convention of the association will be held in Convention Hall, Rochester, N. Y., September 6, 7, 8 and 9. The previous convention chose wisely in selecting the place for its next gathering, and there is no reason why the coming meeting should not be the most successful and enjoyable one ever held by the association. Any one desiring particulars may secure the same by addressing the secretary, Mr. Frank P. Foster, Corning, N. Y.

Calendar of Meetings

June 21-24.
American Society of Civil Engineers.—Annual Convention, Chicago, Ill.—Charles Warren Hunt, Secretary, 220 W. 57th st., New York City.

June 22.
New England Water Works Association.—June Outing, Providence, R. I.—Willard Kent, Secretary, Narragansett Pier, R. I.

June 21-23.
Indiana Municipal League. — Annual Convention, Richmond.—Baltz A. Bescher, Secretary, Richmond, Ind.

June 22-24.
American Institute of Chemical Engineers.—Semi-annual Meeting, Niagara Falls, N. Y.—J. C. Olsen, Secretary, Polytechnic Institute, Brooklyn, N. Y.

June 23-25.
Society for the Promotion of Engineering Education.—Annual Meeting, Madison, Wis.—Henry H. Norris, Secretary, Cornell University, Ithaca, N. Y.

June 27-30.
American Institute of Electrical Engineers. Annual Convention, Jefferson, N. H.—R. W. Pope, Secretary, 33 West 39th st., New York City.

June 28-July 2.
American Society for Testing Materials. Annual Meeting, Atlantic City, N. J.—Edgar Marking, Secretary, University of Pennsylvania, Philadelphia, Pa.

June 30-July 1.
American Society of Heating and Ventilating Engineers.—Semi-annual Meeting, St. Louis, Mo.—W. M. Mackay, Secretary, P. O. Box 1818, New York, N. Y.

July 26-28.
Ohio Electric Light Association.—Annual Convention, Cedar Point, Ohio.—D. L. Gaskill, Secretary, Greenville, Ohio.

July 26-27.
Western New York Volunteer Firemen's Association.—Tenth Annual Convention, Lockport. Charles F. Foley, Secretary, Lockport, N. Y.

August 17-20.
National Firemen's Association.—Thirteenth Annual Convention, Rochester, N. Y. Bert Fisher, Secretary, 3812 Wabash ave., Chicago, Ill.

August 23-26.
League of American Municipalities.—Annual Convention, St. Paul, Minn.—John MacVicar, Secretary, City Hall, Des Moines, Ia.

August 23-26.
International Association of Fire Engineers.—Annual Convention, Syracuse, N. Y.—James McFall, Secretary, Roanoke, Va.

September 21-23.
New England Water Works Association.—Annual Meeting, Rochester, N. Y. —Willard Kent, Secretary, Narragansett Pier, R. I.

October 10-14.
American Street and Interurban Railway Association.—Annual Convention, Niagara Falls, Ontario.—H. C. Donecker, Secretary, 29 West 39th st., New York, N. Y.

October 11-16.
American Society of Municipal Improvements.—Seventeenth Annual Convention, Erie, Pa.—A. Prescott Folwell, Secretary, 239 W. 39th St., New York, N. Y.

November 14-18.
National Municipal League.—Annual Meeting, Buffalo, N. Y. Clinton Rogers Woodruff, Secretary, North American Building, Philadelphia, Pa.

PERSONALS

ARMSTRONG, JUDGE GEORGE W., president of the Consumers' Light and Heating Company, which furnishes the city of Fort Worth, Tex., has resigned and gone into retirement on his ranch, "where there are no Commissioners, no meters, no gas bills, no policemen and no politics."

BAILY, T. C. J., JR., head of the Department of Street Extensions, District of Columbia, has been appointed Engineer of Bridges, succeeding W. J. Douglas, resigned. J. W. Dare will have charge of the street extension work, under the direction of M. C. Hazen, District Surveyor. The separate Department of Street Extensions is abolished.

BENZENBURG, GEORGE H., Chicago, Ill., has been appointed Consulting Engineer of the Water Board.

BOND, ROBERT A., Union, N. J., has been elected Chief of the Fire Department.

BRADSTREET, HOWARD, Secretary of the Parks and Playgrounds Association for several years, has been named as Superintendent of Parks for Manhattan and Richmond at $2,500 per year by Park Commissioner Stover, of New York City.

BROCK, J. VOL, Mayor of Franklinton, La., who was defeated at the election for Mayor, has received his commission from the Governor for that office. The Board of Aldermen had passed a resolution declaring that there was no election as to Mayor, and recommending that D. E. Branch be appointed. It was expected that the Mayor would attach his resignation to the resolution and forward it to the Governor.

BURWELL, ROBERT L., and Arthur L. Reeder, Baltimore, Md., have been appointed designing engineers on the Water Board, Baltimore.

CANHAM, GEORGE, Ridgeway, N. Y., has been appointed Superintendent of Highways, succeeding James Conkey.

CARLE, N. A., Seattle, Mont., has opened an office in the Central Building for practice as consulting and contracting engineer in mechanical, electrical and mining work.

LA CHICOTTE, HENRY A., principal assistant engineer in the Department of Bridges, New York, has been appointed Deputy Chief Engineer.

EDMUND, JOHN D., Mayor of Leavenworth, Kan., 1897-99, when he tore up wooden sidewalks in all parts of the city and made the property owners build brick ones, died last week, aged 72 years. He was unpopular at the close of his term, and was known as "Sidewalk Jack," but became very popular before his death, when the people found the advantages of good walks.

GILLON, DR. J. B., Taunton, Mass., has been reappointed Park Commissioner for a five-year term.

MOORE, JOHN E., New Britain, Conn., has been elected President of the Board of Public Works.

NOBLE, A. W., Laurel, Miss., has been elected Mayor, defeating J. C. Clark.

NOON, A. H., Nogales, Ariz., has been elected Mayor.

PRITCHARD, ASA B., Somerville, Mass., has been appointed Street Commissioner.

PEOTTER, R. S., Brooklyn, N. Y., has been appointed assistant professor of civil engineering in the Polytechnic Institute, Brooklyn, succeeding Prof. D. D. Barlow, who has recently been elected Secretary of the Atlantic, Gulf & Pacific Company. Mr. Peotter will take charge of hydraulic work. He was graduated from the University of Wisconsin in 1905 and has since been engaged in irrigation and hydroelectric work, principally in Canada and in the Middle West.

ROURKE, L. H., has been appointed Superintendent of Streets of Boston, Mass., by Mayor John F. Fitzgerald, and approved by the Civil Service Commisssion, succeeding Guy C. Emerson. Mr. Rourke has just returned from Panama, where he was engineer in charge of the central division of the canal work. Prior to taking up the work there, three years ago, he was engaged in railroad construction work in Venezuela, Argentina and other South and Central American countries.

SCHAIDT, LEANDER, Cumberland, Md., has been appointed City Engineer, and Ernest Hartman, Assistant City Engineer and Superintendent of Streets.

TOWNER, LOUIS C., Grand Rapids, Mich., has been elected Smoke Inspector of the city.

ULLRICH, JACOB, Englewood, N. J., has been appointed Chief Engineer of the Fire Department.

WILHOYTE, COL. R. H., Sheffield, Ala., has been unanimously elected Mayor to succeed the late W. R. Westin.

TRADE NOTES

Cast Iron Pipe.—Chicago: There is a good run of orders and lettings from small municipalities. Quotations: 4-inch, $28.50; 6 to 12-inch, $27.50; 16-inch and up, $26.50. Birmingham: Local manufacturers have sufficient orders to run them several months. Quotations: 4 to 6-inch, $23; 8 to 12-inch, $22; over 12-inch, average, $21. New York: Business is quiet. Quotations: 6-inch, $25.50 to $26.

Lead.—The price has stiffened and there is a better demand. Quotations: New York, 4.375c.

Municipal Buying.—Municipal buying has again become the principal support of the market at Omaha, Neb. Steam, gas or oil engines, water wheels, governors, generators, motors, pumps, switchboards and auxiliary apparatus in considerable variety constitute a large percentage of sales recently made, and from present indications it will be even greater during the next six or eight weeks. This, however, simply serves to swell the aggregate volume of business transacted, for the reason that buying in behalf of industrial plants, central stations, electric railways and construction work, the last named of which has broken all records, is not perceptibly diminishing. Acceptance on the part of municipalities and county boards of bids made by Eastern manufacturers deprives local machinery houses of the benefit of a good deal of the increase in trade, but they are getting a fair proportion of it, often in the form of complete contracts.

Leadite. — The Leadite Company, Inc., Land Title Building, Philadelphia, Pa., has issued a pamphlet calling attention to the advantages of its material. The claim is made that by its use a saving of 50 per cent to 65 per cent in the cost of water main joints may be effected. The statement is made that Leadite in actual service has been proven to completely resist the action of expansion and contraction, of unequal settlement, of oxidation and electrolysis, and of jar, shock and vibration. The company is ready to furnish evidence that Leadite is cheaper to use, more efficient in service and far more durable than any other material, and that joints made with Leadite increase in strength with age.

Motor Fire Engine Test.—Commissioner Charles S. Owen, Fire Chief Charles Little and a number of officials of the Fire Department of Rochester, N. Y., witnessed a test of the Luitwieler motor fire apparatus at the factory yards in Ames street recently. The test was satisfactory.

Hydrant Cut-Off Valve.—F. S. Seagrave, Detroit, Mich., has been in receipt of a heavy run of orders from all sections of the country for the Crescent cut-off valves of his manufacture, which are particularly adapted to use with large water hydrants.

Rubber Tires.—The Goodyear Tire & Rubber Company, Akron, O., will enlarge its plant by the erection of a five-story building 80 x 400 feet, plans for which are being made by the Osborn Engineering Company, Cleveland. Additional power equipment will be required.

Rubber Tires.—The general contract for a new $500,000 plant to be built by the Firestone Tire & Rubber Company, Akron, O., has been let to George W. Carmichael & Co., Akron. Plans for the power building have not yet been completed.

New England Power Projects.—The last obstacle seems removed from the project of the Northern Connecticut Power Company to establish a great hydraulic station in Enfield, Conn., damming the Connecticut River for the purpose, an undertaking which will not only provide very large amounts of power, but which will render the river navigable to Springfield and Holyoke, Mass. The Connecticut River Company, which supplies power from the river to the Windsor Locks manufacturers, had stood in the way of the enterprise, but it is now announced officially that an arrangement has been made between the two corporations by which the Northern Connecticut Company will furnish the old company with an adequate supply of water for its needs, and that objections, which have been largely in evidence at Washington, in connection with the required Congressional permission to build the dam, no longer exist. The dam will give a thirty-foot head of water, and the volume is so very large that the estimated development is 35,000 horsepower. A lock will permit of the passage of boats of considerable tonnage, placing the two Massachusetts cities in touch with tidewater, giving them the advantages of water freights as well as their share in the power. Between $4,000,000 and $5,000,000 will be expended on the project. Another great power project is planned for the Deerfield River by interests reported to be closely allied with those which are operating the power property at Vernon, Vt., on the Connecticut River, and transmitting it in large units to various manufacturing centers, notable among them Worcester, Mass. The Deerfield is a tributary of the Connecticut. The topography of the country is such that a storage reservoir can be created just over the New Hampshire line from Massachusetts, and the water carried by a flume with a fall of 800 feet to a power station at Zoar, Mass., south of the Hoosac Tunnel. The combination of this enormous head—which puts the development in a class by itself in the East—with ample water storage, assures 25,000 h. p.

Meter Box.—H. W. Clark Co., 115 South Seventeenth street, Mattoon, Ill., has published a new catalogue M describing the water works appliances manufactured under the patents owned by the company. The Clark meter box is perhaps the best known among these appliances. Besides the meter box in styles adapted to various conditions and climates are shown forms for making concrete meter box bodies. Other devices are the Teksagon meter coupling, service box keys, inspectors' gauges, surface reservoir and special water works gauges, a system of well construction, and a deep well plunger.

Water Softeners and Purifiers.—The Dodge Manufacturing Co., Mishawaka, Ind., is distributing hangers showing complete and sectional views, with comprehensive descriptive data, of the Eureka water softener and purifier. The Dodge company manufactures this product, and the hangers referred to illustrate in colors the process by which it operates.

Metal Culverts.—Corrugated metal culverts, which form the principal product of the Harris Culvert Company, Minneapolis, Minn., have come into such extensive use this year that production facilities are being severely taxed to keep pace with the requirements of the communities now making road improvements. This is getting to be a prominent feature.

Tarvia.—The largest order that has yet been issued for a bituminous binder for macadam roads, half a million gallons, has just been given by the authorities of the Borough of Brooklyn, Greater New York. It calls for half a million gallons of tarvia to be used during the coming summer on various macadam roadways.

There are many sections on the outer borders of Brooklyn where the character of the adjoining property does not warrant the laying of a permanent pavement, although the traffic would more than justify it. Accordingly, Brooklyn has had many miles of macadam roads which were the best that the locality could afford, and yet were entirely incapable of standing up under the heavy automobile traffic. The cost of maintenance has reached a point where some drastic change in the handling of the problem is absolutely essential. Property owners were demanding relief from the intolerable dust nuisance, and the automobilists were complaining bitterly of the worn-out condition of the roads.

As early as 1903 there had been experiments in Brooklyn with the tarvia process, and as the art of preserving roads and preventing dust by this means advanced from year to year, the results were increasingly satisfactory. The large purchase for 1910 indicates that all the important macadam thoroughfares within the jurisdiction of this borough are to be treated with tarvia.

Tar.—Brill & Gardner, engineers and architects, 204 Dearborn Street, Chicago, have awarded a contract for the erection of twelve buildings for the Barrett Manufacturing Company. A power house, pump house, car repair shop and laboratory are included in the list. Part of the necessary equipment has been provided for, but additional machinery will be required for the car repair shop.

Metal Culverts.—The North Dakota Metal Culvert Company, Fargo, N. D., has issued its first general catalogue covering the entire line of products which it manufactures. The publication is divided into four sections. The first section contains information relative to prices, delivery, freight rates, sizes, capacities, etc., of its galvanized metal products. Sections 2 and 3 describe and illustrate galvanized metal culverts and galvanized steel portable bins. Section 4 is devoted to the various types of galvanized steel cans, tanks, etc., made by the company. Each description is accompanied by a table showing sizes, capacities and prices of these products.

Crushing Plant.—Two large gyratory crushers and other machinery have been installed by the Biggsville Crushed Stone Company, recently organized to develop quarries near Biggsville, Ill. Some additional equipment will be needed later, but for the present the company's requirements have been supplied.

New Crusher.—The Morrison Crusher & Mining Machinery Company was recently organized at Colorado Springs, Col., to establish a plant for the manufacture of a new type of crusher patented by B. L. Morrison.

Crushing Plant.—The Kansas City Material Company, recently organized, of which W. H. Coffery, Kansas City, is president, will soon complete a large crushing plant near Independence, Mo. The initial equipment has been ordered, but more will be needed later.

Road Machinery.—The latest catalogue of the Austin Company consists of 112 pages. This publication covers the entire line of earth-handling machinery with which the name of Austin has been associated for almost sixty years. The New Era Grader, which is the leading feature of this catalogue, has been one of the principal machines used in the construction of all the great railroads and trunk lines to the West over the prairie. There is perhaps no machine in the history of road making that has been such an important single factor in forwarding the work, taking the place as it does of hundreds of men and dozens of teams. The catalogue also describes other earth-handling lines of machines, such as dump wagons, wheel and drag scrapers, railroad plows, etc. It is not confined to earth-handling machinery only. It describes machinery for rock crushing and road building. This factory is the only one in the United States which produces within its own walls an entire line of machinery for building roads from the virgin soil upward. The factory makes everything, from a drag scraper to the most powerful and heavy road rollers. It produces rock crushers with a capacity of 50 to 2,000 tons per day.

Vitovia.—The Dons Road Improvement Company, Rochester, N. Y., is the inventor and owner of, and the Warner-Quinlan Asphalt Company, Syracuse, N. Y., the agent for United States and Canada for, a new road preparation which has been placed on the market under the trade name of "Vitovia." The preparation is the invention of Henry N. Dons, chemist and road builder. The object of the invention is to prepare a moderate-priced material free from the objections to ordinary tar.

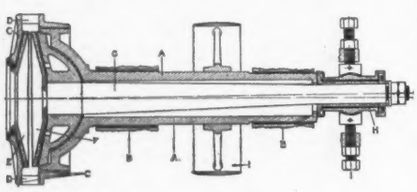
Granite Paving.—The Wisconsin Granite Company, Chicago, Ill., producer of granite paving blocks, curbs, crossings, crushed granite, monumental and rough stock, has issued an interesting 32-page booklet showing the adaptation of this material for paving work. There are shown some interesting tests made by the office of Public Roads of the United States Department of Agriculture, reporting on this material on roads in various parts of Wisconsin, all of which show great hardness and high resistance to wear. The booklet contains the Chicago specifications for granite-top macadam pavements, for granite combined curb and gutter, granite bitulithic pavement, granite cement pavement, granite block pavements. There is also a discussion on granite concrete and granite concrete curb and gutter, together with prices and comparative price lists of granite as compared to some other paving material. Altogether, the products are attractively set forth and the booklet contains illustrations of the plants and quarries of the company.

Hydraulic Stone.—The Fisher Hydraulic Stone and Machinery Company, Baltimore, Md., announces that owing to a fire at its Eastern factory, it has been necessary to transfer both the manufacture of this machinery and the general working force of the office to the Western factory at Mount Gilead, O., and from that point all business of the company will have prompt and careful attention, and all communications should be addressed to the Fisher Hydraulic Stone and Machinery Company, Mount Gilead, O., saving delays of passing through the office in Baltimore to come before the general manager.

MUNICIPAL APPLIANCES

A Disc Rock Crusher

THE Symons disc crusher is designed to reduce to different sizes at one operation the rejections from gyratory crushers. The machine, which is manufactured by Symons Brothers, Chicago, consists of a hollow shaft, mounted in two bearings B and B. One end of this hollow shaft is enlarged and threaded. The cap C is screwed onto the enlarged end of the shaft. This cap has cross-arms D, between which the material escapes. Inside of the cap C is fastened one of the crushing discs E. This outer disc E is thus firmly connected to the hollow shaft and must revolve with it. The opposing disc F is secured to the solid shaft G which has a half-ball enlargement supporting the disc, and providing a ball-and-socket connection between the inner shaft and outer shaft. The inner shaft G, at its other end, extends out beyond the hollow shaft, and is carried in an independent bearing H, which may be shifted sidewise to throw one disc at any desired angle to the other. When power is applied to the belt wheel I, and the hollow shaft rotates, it of

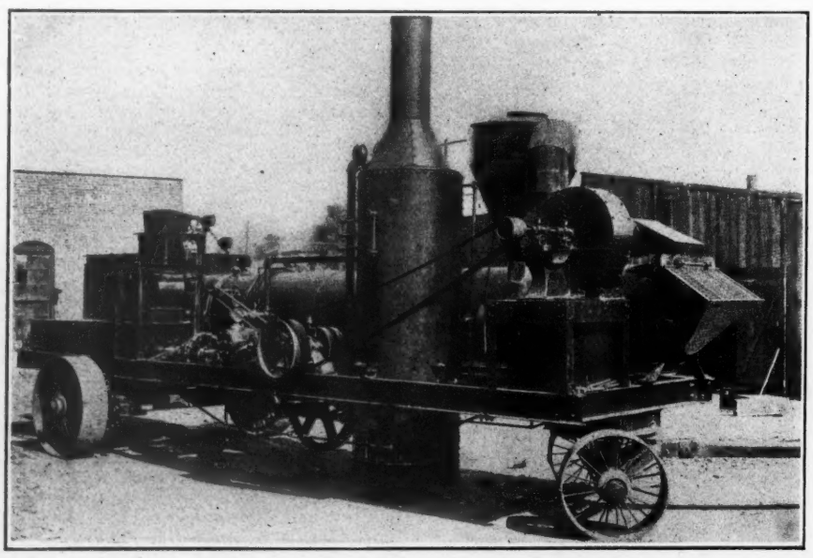


NEW SYMONS CRUSHER

course carries with it the cap C and disc E, secured thereto. The inner shaft and disc F tend to revolve, but are not driven positively when the machine is running empty. When, however, stone is introduced between the discs, the crushing action immediately makes all parts shown in the diagram rotate together—excepting, of course, the outer bearings. The discs are of manganese steel. Centrifugal force is utilized to carry the material through the machine and outwardly through the exit opening, and so avoid choking or clogging. Provision is also made for quickly changing the distance between the crushing discs to vary the size of the product. A range of adjustment is allowed, making it possible to crush stone to any sizes between 3½ and ¼ inch. Another adjustment allows the angle between the discs, or what corresponds to the crushing stroke, to be regulated while the machine is running. Experience has shown that the crushing discs, in use, wear smooth, not in grooves. Wear may be taken up, by placing the discs closer together. These machines are made in three sizes. One size, having crushing discs 48 inches in diameter, has a receiving opening 16x8 inches, and reduces to any size of product down to ½ inch. The next size, having discs 24 inches diameter, will take in 4-inch stone and reduce to any size down to ¼ inch. The smallest size, having discs 13 inches in diameter, takes in 2-inch stone, reducing to any size down to ⅛ inch and less. Stone, fed between the discs through a central opening in one of them, is caught by them where they are widest apart and carried between the discs to where they are closest together, being crushed during transit. During the next half revolution the smaller particles fly out from between the discs, impelled by centrifugal force, while the larger pieces slip farther out and are caught again for like crushing action. The speed of the machines varies from 250 to 600 revolutions per minute.

Portable Asphalt Plant

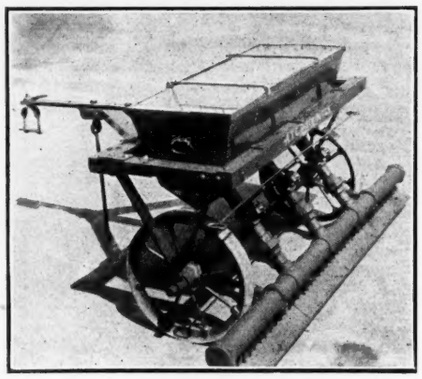
A PORTABLE paving plant has been constructed by the Bitu-Mas Company, Indianapolis, Ind., for use in constructing Bitu-Mas pavements. In this process the excavated material of a sand or gravel roadway is excavated, passed through the plant, where they are mixed with bitumen and then laid on the sub-grade. The plant consists of an upright boiler, an engine, an asphalt tank, a sand dryer and a mixer. The whole outfit is mounted on a truck with wide wheels and it is propelled by its own power.



PORTABLE PLANT FOR MAKING BITUMINOUS ROAD OUT OF NATURAL

Oil or Tar Distributor

AN oil or tar distributor operating by gravity and entirely distinct from the wagon in which the tar or oil is carried is manufactured by the American Tar Company, Boston, Mass. The appliance consists of an iron tank shaped like a trough mounted on wheels. The long dimension of the tank is parallel with the axle on which it is mounted. The tank is located between the wheels and above

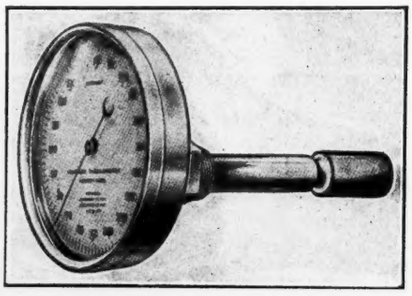


TAR OR OIL DISTRIBUTOR

them. A frame of angle iron carrying the tank is braced to the axle. Three 2-inch pipes with valves lead to a larger pipe which constitutes the main portion of the ditsributor, which is considerably larger than the axle. Openings about ten inches apart let the tar or oil out. It falls on a board and is spread out in a uniform layer. A simple device allows the distributor to be attached to any sort of a tank wagon. The apparatus can be used on strips from 2½ to 10 feet wide. As to the cost of operation, figures furnished by Walter Cressy, General Contractor, 160 Western avenue, Gloucester, Mass., are to the effect that he laid 6,000 gallons in one day, covering a mile and a half of road, with fifteen men, two tank wagons, and an average haul of one mile. He states that he could easily have covered half a mile more if he had had men enough to distribue the sand over the oil.

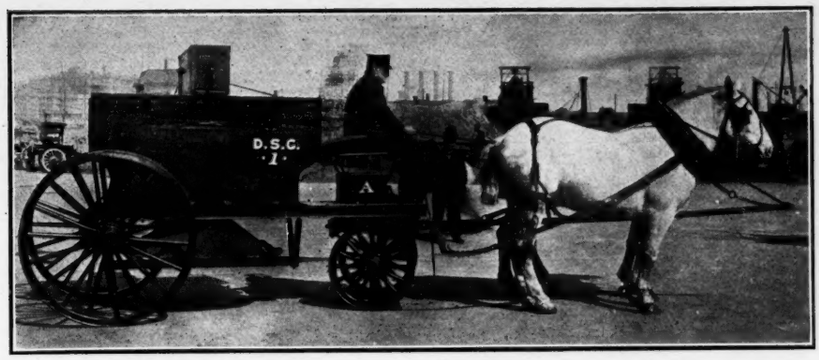
Thermometers for Mechanical Uses

THE Standard Thermometer Company, successor to the Parker Manufacturing Company, Clifton and Shirley streets, Boston, Mass., manufactures thermometers for use in connection with various manufacturing processes. Some of the instruments range from zero to



STANDARD THERMOMETER

400° Fahrenheit. The thermometer consists of a circular dial with a needle indicating the temperature. A rod five inches or more in length extends into the oven or material, the temperature of which is to be taken. Longer extensions can be arranged if desired. The thermometers are valuable in registering the temperature of tar, asphalt, etc.



APPLIANCE FOR SPREADING SAND OR STONE CHIPS OVER STREET

Sand Distributor

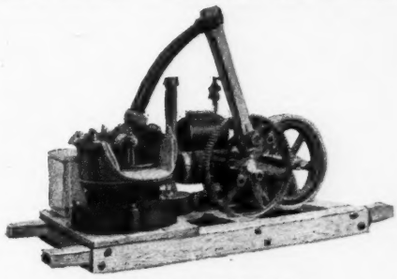
A MACHINE for distributing sand over the surface of a street for various purposes has been placed on the market by the Borough Supply Company, 602 Degraw street, Brooklyn, N. Y., of which John F. Warth is the head. The machine consists of a wagon body shaped like a hopper mounted on a substantial four-wheeled framework. The wagon body holds one cubic yard, and the sand is distributed through a ball valve or gate at the bottom, where it falls on a cone-shaped sheet iron spreader. This spreading device is revolved by power derived from the rear axle. A sprocket wheel is placed on the axle on the inner side of the wheel. A small chain belt runs to another sprocket on a shaft crossing the top of the wagon. The greater part of this shaft and two bevel gears, transmitting the power to a spindle to the bottom of which the conical spreader is attached, are enclosed in a box with a lid. A lever on the same side of the wagon as the spreader wheel side of the driver throws the apparatus in or out of gear. At the lower end of the spindle there is a ball, located just above the spreader. By means of a lever on the other side of the driver is a lever which raises the ball spindle and spreader so as to close a circular opening in the bottom, through which the sand runs to whatever size is desired. At the top of the spindle is a key, so that the gearing is not affected by the opening and closing of the valve. At the periphery the spreader is bent into a horizontal rim and a number of guides extending a short distance radially assist in the uniform distribution of sand. A few inches above the ball is a vane or blade attached to the spindle, which by its revolution tends to prevent clogging.

This machine was used last winter on days when the pavements were icy on certain streets on the upper West Side in New York City by the Street Cleaning Department. It was also used in the vicinity of fire engine houses on days when the weather conditions did not require its use on roadways. One charge of the machine, a cubic yard, would spread a strip twelve blocks, 3,100 linear feet, long by about five feet wide, using sand carrying an ordinary amount of moisture. With dry sand it would go even further. The machine has also been used by the Metropolitan Park Commission of Massachusetts for spreading sand over oiled roads. The machine was of no great value on new work on account of the wheels picking up the tar or asphalt. This difficulty might perhaps be overcome by wetting or sanding the wheels. The machine will handle stone screenings as well as sand

In case dried sand is used with the machine the driver can operate it alone. With wet sand, however, an additional attendant is needed to keep it from sticking to the sloping front and read ends.

Diaphragm Trench Pump

THIS portable trench pump, mounted on a strong skid and bolted, is a complete power-driven outfit for use of builders, railroads, shipowners or on public works, where it is necessary to raise large quantities of water. The saving in the cost of operation as compared to the usual man power is claimed to be surprising. The engine is a strong three-horsepower water hopper cooled, exerting a pull or lift of 990 pounds on the pump lever at each stroke. The wrist pin on gear



GASOLINE SEWER PUMP

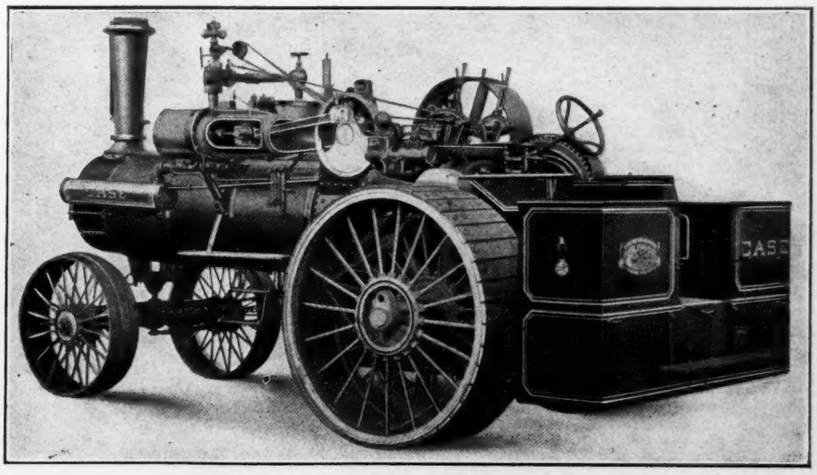
wheel can be changed to either one of the four different strokes, and the revolutions of the engine can be regulated to run the pump from 30 to 50 strokes per minute. The pump is of up-to-date design, strong and simple in construction. It has a diaphragm of the highest quality of rubber which can be readily replaced when worn. The outfit can be supplied either with bottom or side suction, as desired, 3-inch in either case, and can be used with either pipe or suction hose. The capacity of this outfit is from between 3,000 to 3,500 gallons per hour. It is made by the Inter-State Equipment and Engineering Co., 1775 Old Colony Building, Chicago, Ill.

Dual Pneumatic Tires

DUAL pneumatic tires in connection with quick-detachable, demountable rims, form a combination which the manufacturers, the Firestone Tire and Rubber Company, claim reduces to the smallest degree the risk of tire delay in reaching nres and making quick runs. Most of the strain falls upon the rear tires and most of the punctures and blowouts happen there. To prevent delays from this cause the dual pneumatic tire has been formed by fitting two pneumatic tires side by side on each of the rear wheels. As ninety-nine out of a hundred injuries affect only one of these tires at a time, its companion bears the load until a convenient opportunity for removing the injured tire and substituting a fresh one. Meantime the cars goes right on without slackening speed.

Traction Engine for City Streets

To meet the requirements of ordinances in certain municipalities which prohibit the operation of traction engines on paved streets when equipped with regular grouters, the J. I. Case Threshing Machine Co. has designed a special traction wheel with flat grouters, which will not injure even the best paved street. These wheels are made of enormous strength to increase the weight of the engine, thereby increasing its traction power (which is somewhat lessened by the smooth grouters). These wheels are made of equal strength throughout, the hub, spokes and tire all being much heavier than the regular engine wheels. The spokes are 32 in number on the 30-horse, and 40 in number on the 36, 45, 60 and 75-horse sizes, and are 1 inch in diameter, upset to 1⅜ inches at the threads. The tire is ¾ inch thick, reinforced with channels riveted to its inner circumference. The gear braces are 1¼ inches in diameter, and are each held to the tire by 1¼-inch rivets. The grouters are riveted to the tire with 1-inch rivets. The spokes have counter-sunk heads and extend through both grouters and tire and are fitted with lock nuts at the threaded end which screw into the hub. Special drop-forged ice picks are regularly furnished to enable the engine to get out of slippery places. These picks are inserted in the counter-sunk holes provided for them in the tire, and are held in place by means of a cotter-pin so that they may be quickly inserted or removed. The company also furnish special front wheels equipped with wide band which present a smooth surface that will not injure pavements. The wheels are made for 30, 36, 45, 60 and 75-horse engines.

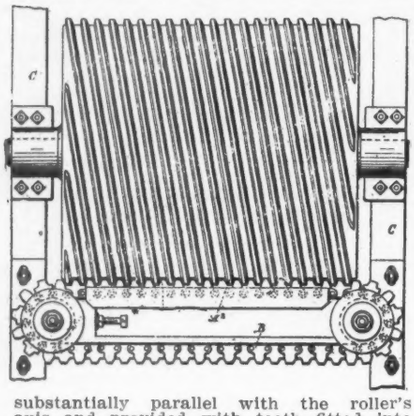


TRACTION ENGINE WITH WHEELS THAT DO NOT INJURE PAVEMENTS

PATENT CLAIMS

958,346. ROAD-ROLLER. Frederick F. Williamson and Daniel Brennan, Jr., New York, N. Y., assignors to The Sicilian Asphalt Paving Company, New York, N. Y., a Corporation of New York. Serial No. 469,069.

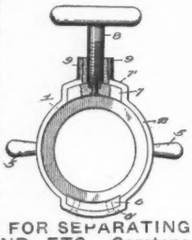
A road roller provided with spiral working ridges separated by grooves, in combination with a chain mounted to travel



substantially parallel with the roller's axis and provided with teeth fitted into the roller's grooves.

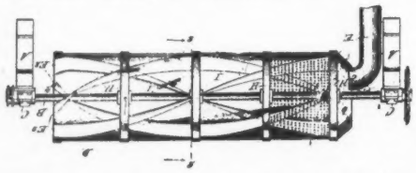
959,258. FIRE-HYDRANT COUPLING. Edward W. Purves, Chicago, Ill. Serial No. 531,788.

In a fire-hydrant coupling, an annular casing, an adjustable exteriorly threaded nozzle secured in one end of the annular casing, offsets forming interior recesses in the opposite end of the casing, a segmental threaded section detachably secured in one recess and a radially adjustable segmental threaded section seated in the other recess.



958,565. APPARATUS FOR SEPARATING GRAVEL FROM SAND, ETC. Carstene Torjusen and William Idstrom, New Orleans, La. Serial No. 456,378.

In a separator, the combination of suitably spaced supports, a shaft journaled in suitable bearings on said supports, spiders fixed on said shaft at intervals in the length thereof, a cylindrical shell fixed to said spiders and perforated and having one of its ends open throughout its diameter and also having a truncated cone at its



opposite end, a pipe extending through the latter end and into the shell and adapted to deliver material to be separated thereto, and equidistant blades arranged spirally in the shell and extending throughout the length thereof and connected to both spiders and shell and having their portions adjacent the discharge end of the shell of increased pitch and also having right-angle flanges which extend forward from their inner edges; the said blades being provided with perforations, for the purpose set forth.

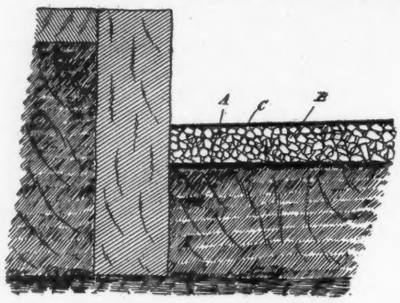
953,064. ROAD CONSTRUCTION. Joseph H. Amies, Philadelph.a, Pa., assignor to The Amies Asphalt Company, Philadelphia, Pa., a Corporation of South Dakota. Serial No. 481,174.

The herein described method of road construction which consists in forming a suitable foundation, placing thereon a due

amount of soil, moistening the same with water, then placing thereover a due amount of calcium oxid, then covering the above elements with liquid asphalt, and then over all placing a body of crushed stone and the like substantially as and for the purposes set forth.

959,976. COMPOSITE PAVEMENT. Edwin C. Wallace, East Auburn, Cal. Serial No. 504,858.

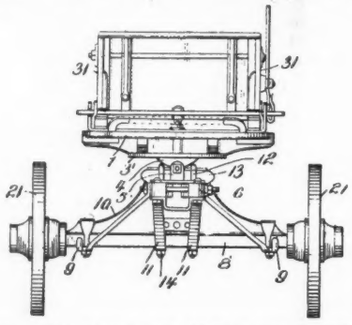
A pavement consisting of a lower course of large pieces of stone, smaller pieces of stone and stone dust mixed with sufficient bitumen of proper consistency to thoroughly coat all of the partciles, which is previously mixed and then laid, without compression, on a suitable foundation, and



a previously mixed, upper course composed of finely divided mineral matter mixed with sufficient bituminous binding material to thoroughly coat all of the particles which is first spread in a thin layer on the lower course and thereafter blended and bonded with the lower course by compression, whereby the two courses are made a compact and substantially integral mass which is densest at its top.

959,414. FIFTH-WHEEL FOR DUMP-WAGONS. Lorenzo H. Young, Hagerstown, Md., assignor of one-half to V. P. Hill,, Hagerstown, Md. Serial No. 458,050.

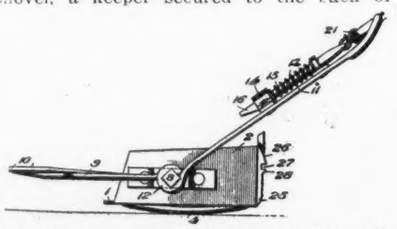
In a dump wagon having a front platform mounted on the frame thereof, a flat cylindrical ring beneath the platform and connected therewith, a hound, U-shaped members upon the hound arranged diametrically opposite each other and disposed normally longitudinal of the center of the wagon frame, curved shoes pivotally connected between the arms of the U-shaped member and bearing upon the ring, a bolster connected with the hound, an axle upon the bolster, bracing members for the axle and hound, yoke members positioned



upon each side of the bolster and engaging the said brace members adjacent each side of the axle, a king bolt, said king bolt comprising a pair of members, the lower member being connected with the bolster and being provided with an enlarged perforated head, the second member of the king bolt being connected with the platform and being provided with a bifurcated head having openings adapted to align with the opening within the head of the first section and a removable bolt for these openings, substantially as and for the purpose set forth.

959,668. ROAD-SCRAPER. Henry Wiechelman, Long Pine, Neb. Serial No. 532,101.

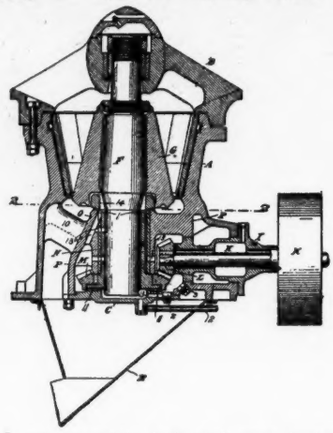
A road scraper comprising a shovel, a draft bail pivotally connected to said shovel, a frame pivotally connected to said shovel, a keeper secured to the back of



said shovel, a spring bolt connected to said frame to engage said keeper, and a lever pivoted to the frame and connected to said bolt for operating the same to dump the contents of the shovel.

960,232. CRUSHER. Arthur Niedermeyer and Richard Bernhard, Milwaukee, Wis., assignors to Power & Mining Machinery Company, a corporation of New Jersey. Serial No. 510,689.

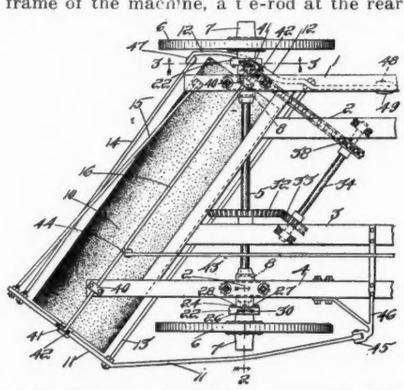
In a gyratory crusher, the combination with a crusher shaft and crushing head thereon, of shaft driving mechanism including an eccentric directly below the



head, an eccentric hub and gear inclosing chamber below the head, and an outer casing providing an annular delivery space extending to the bottom of the crusher about the rear chamber through which the crushed material is delivered below the driving mechanism.

959,000. STREET-SWEEPING MACHINE. Josiah Fowler, Cambridge, Mass. Serial No. 494,050.

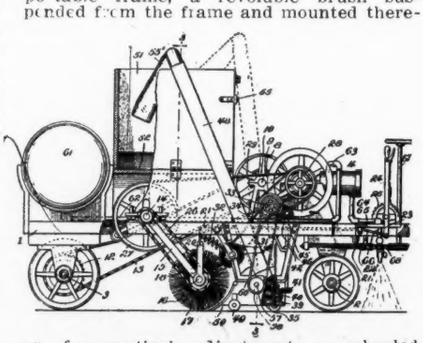
In a street-sweeping machine, an axle on which two wheels are mounted, a rotary broom, two arms on which the axles of the broom are journaled intermediate their ends, said arms being pivoted at their forward ends to a fixed part of the frame of the machine, a tie-rod at the rear



of the broom axle rigidly connected with one of said arms and pivotally connected at the other end with the other of said arms and intermediate mechanism between the wheels and the broom axle whereby the rotation of the wheels gives rotation to the broom.

959,380. STREET-SWEEPER. James Otis, Ann Arbor, Mich., assignor of one-half to Flora Otis, Ann Arbor, Mich. Serial No. 503,123.

A street-sweeping machine comprising a portable frame, a revoluble brush suspended from the frame and mounted there-



on for vertical adjustment, a wheeled trough forwardly of the brush, a conveyor located in the trough, a blast fan at one end of the conveyor, a receptacle, and a conveying tube connecting the receptacle with the blast fan.

THE WEEK'S CONTRACT NEWS

Relating to Municipal and Public Work—Street Improvements—Paving, Road Making, Cleaning and Sprinkling—Sewerage, Water Supply and Public Lighting—Fire Equipment and Supplies—Bridges and Street Railways—Sanitation, Garbage and Waste Disposal—Police, Parks and Miscellaneous—Proposals and Awards

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also corrections of any errors discovered.

STREET IMPROVEMENTS

Mobile, Ala.—Board of Public Works has decided to grade and pave Broad st. with creosoted wood block.—J. T. Schley, President.

Jonesboro, Ark.—City has sold $50,000 paving bonds.

Berkeley, Cal.—Council has ordered extension of Oxford st.

Greeley, Col.—County Commissioners have decided to repair main road from this city to Estes Park.

Southington, Conn.—Citizens have voted $8,500 for building Summer st. macadam road.

New Castle, Del.—Election on $30,000 bonds for paving streets will be called; material not yet decided.

St. Petersburg, Fla.—Citizens will vote July 19 on $67,500 bonds for paving various streets with brick.

West Palm Beach, Fla.—Palm Beach Farms Co., Model Land Co. and others will construct hard-surfaced road; distance of about five miles.

Atlanta, Ga.—Street Committee is considering paving of De Kalb ave.; cost $2,000.

Atlanta, Ga.—Fulton County Commissioners have decided to expend about $10,000 in improving road between McCall's station and East Point.

Twin Falls, Ida.—City is considering paving of Main and Shoshone sts.

Freeport, Ill.—Maple ave. residents are urging improving of Maple ave. with tar macadam.

Huntley, Ill.—Village Council has passed ordinances for paving various streets.

Sterling, Ill.—Board of Local Improvements has ordered City Engineer to prepare plans and estimates of cost for paving E. 4th St.

Fort Wayne, Ind.—Board of Works has approved resolutions for cement walks on five streets; plans have been ordered for walks on two streets.

Indianapolis, Ind.—Board of Works is considering resurfacing of two streets, curbing of Gray st. and paving of two streets and one alley with wooden block, asphalt, bituminous, concrete or brick.

Jeffersonville, Ind.—Monroe Township has voted bonds for construction of good roads.

Logansport, Ind.—Paving of Broadway, 5th and Sycamore sts. is being considered.

Marion, Ind.—Council has appropriated $1200 for street improvements and repairs.

Muncie, Ind.—County Commissioners will pave E. Wapsor st. with brick.

Atlantic, Ia.—Plans are being prepared for two miles of paving.

Hampton, Ia.—Council has decided to proceed with paving of several streets.

Topeka, Kan.—City Commissioners are considering petitions asking for 8 miles of walks.

Hopkinsville, Ky.—Christian County Fiscal Court will issue $27,000 of bonds to continue road construction.

Mt. Sterling, Ky.—Carrol C. Chenault, merchant, has inaugurated movement to secure brick streets.

Amite, La.—Black Swamp Model Road League will construct two miles of model road leading into city.—D. H. Sanders, President.

New Orleans, La.—Council is considering ordinance providing for the paving of Peniston st. with asphalt.

Malden, Mass.—Street Commission has recommended that $20,000 be appropriated for laying granite block paving, concrete base, on Pleasant and two other streets.

Bay City, Mich.—County Road Commission has received three petitions asking for extension of the stone road system south to Saginaw County line.

Calumet, Mich.—Calumet Township Committee is considering construction of a new road east of village of Laurium.

Crystal Falls, Mich.—City proposes to pave Main st.; cost $30,000.

Detroit, Mich.—Wayne County will vote next fall on $1,000,000 bonds to improve all county roads.

Grand Rapids, Mich.—Cost of grading and graveling Doezema Court has been estimated at $2,830; grading and paving W. Leonard st. with brick, $25,670, and Caroline place with Portland cement, concrete, granite mortar top, $2,325.—S. A. Freshney, Secretary, Board of Public Works.

Holland, Mich.—Council has decided to pave with brick portion of W. 8th st.; cost about $26,000.

Crookston, Minn.—City Engineer Carroll will prepare plans for asphalt and creosote block paving on Robert and other streets.

St. Paul, Minn.—Two miles of Point Douglas road inside city limits will be macadamized at cost of $7,000.

Virginia, Minn.—City Engineer E. F. Johnson has estimated cost of curb and gutter work on Central ave. at $3,320.50.

Gulfport, Miss.—City will advertise for bids about July 1 on all sidewalk paving not yet laid. Address Mayor Foote.

Meridian, Miss.—City is considering $10,000 bond issue for laying brick or cement sidewalks.—W. G. Wetmore, City Engineer.

Kansas City, Mo.—Utility Board is urging paving.—Clyde Taylor, Counsel.

Springfield, Mo.—Mayor R. E. Lee has recommended $10,000 bond issue for street improvements and drainage.

St. Joseph, Mo.—Council is considering ordinance to pave 22d st. between traction company's rails with brick blocks, filled in with asphalt, and to tax cost against company.

Caldwell, N. J.—Council has passed ordinance for concrete sidewalks on Campbell ave. and stone and concrete walks on Central ave.

Elizabeth, N. J.—Council has ordered paving of Magnolia ave. with oblong trap block pavement on sand foundation.—N. K. Thomson, Street Commissioner.

Jersey City, N. J.—Street and Water Board has decided to widen Montgomery st. at cost of $45,000.

Millville, N. J.—Bids will be asked for building State road from Bridgeton to Sturely.

Newark, N. J.—Mayor Haussling has approved resolution providing for repaving of Market st. with granite.

New Brunswick, N. J.—Board of Freeholders has decided to macadamize road in South Brunswick Township.

Paulsboro, N. J.—Citizens have voted $7,000 bonds for street improvements and extension of gas mains.—Wm. Adamson, Mayor.

Perth Amboy, N. J.—Council is considering laying asphalt block pavement on three streets.

Roosevelt, N. J.—County Engineer Fred F. Simons is preparing plans and specifications for three county roads that are to be rebuilt this summer.

Trenton, N. J.—Council has decided to pave Washington st. with sheet asphalt on concrete base and Beatty st. with R. V. Filbert improved waterproof filbertine pavement cement on concrete base.—H. B. Salter, City Clerk.

Binghamton, N. Y.—Council has authorized sale of $25,000 paving bonds.

Niagara Falls, N. Y.—Council has decided to pave Ferry ave.; cost $30,560.—T. H. Hogan, City Clerk.

North Tonawanda, N. Y.—Board of Public Works will soon begin improving the River road, Erie ave. and Thompson st.

Saranac Lake, N. Y.—Village Board of Trustees has decided to macadamize Park ave. and repair three streets.

St. Johnsville, N. Y.—Citizens have voted $36,000 bonds for paving Main st.

Tonawanda, N. Y.—Paving of Morgan st. with brick is being considered.

Utica, N. Y.—Board of Contract and Supply will readvertise for bids for paving Green and Warren sts.

Williamsville, N. Y.—Board of Village Trustees has approved and accepted plans, specifications and estimates of State Highway Commission for paving Main st.

Biltmore, N. C.—George W. Vanderbilt will construct 6 per cent grade automobile road from foot to summit of Mt. Pisgah; cost $16,000.

Elizabeth City, N. C.—City will expend $120,000 on paving; curbing and grading mainly done on streets to be paved.—D. M. Jones, Chairman Street Improvement Committee.

Bellefontaine, O.—Paving bonds amounting to $35,000 are reported sold.

Columbus, O.—County Commissioners have decided to construct road as extension of Indianola ave., distance nearly one mile.

Dayton, O.—City Engineer Cellarius has estimated cost of paving Herman ave. with brick at $15,043.80, and $15,953.30 with asphalt.

Defiance, O.—County Commissioners have appropriated $2,700 for purpose of jointly building mile of road with State Highway Department.

Somerville, O.—Council is considering ordinance for paving and guttering Main, Church and Depot sts.

Washington, C. H., O.—Plans and specifications will be prepared for improvement of Gregg st.

Zanesville, O.—Board of Local Improvements has decided to pave S. State st. and Walnut ave. with Townsend brick.

Albany, Ore.—Council has decided to pave principal streets.

Ashland, Ore.—Council is considering improvement of four miles of streets with bitulithic.

Altoona, Pa.—Council has passed on first reading ordinance calling election on $260,000 bonds for street and sewer improvements and erection of bridge.

Chambersburg, Pa.—Citizens will vote on $15,000 bonds for paved streets.

Chester, Pa.—Council has decided to ask for bids for paving Du Pont st.; property owners on Madison ave. are urging paving of that thoroughfare.

Oil City, Pa.—Bids will be received June 20 for $50,000 street and sewer improvements.

McKeesport, Pa.—Survey Committee of Councils has recommended passage of number of grade ordinances.

Perkasie, Pa.—Council has directed that all property owners construct pavements within six months.

Philadelphia, Pa.—Council has decided to repave Arch and 12th sts. with wood block.

Pittsburg, Pa.—Public Works Committee has approved ordinances for widening Grant Blvd., Strawberry alley, Diamond st. and Oliver ave.

Silverly, Pa.—Council has decided to pave 5,000 ft. in Colbert ave.

South Bethlehem, Pa.—Council has ordered purchase of two carloads of stone.

York, Pa.—Council has decided to pave North Duke st. and portions of E. College ave. and West Princess st. with bitulithic.

Knoxville, Tenn.—Council has appropriated $3,500 for street widening.

Linden, Tenn.—J. D. Daniels is interested in construction of road from Linden to Perryville; cost $15,000.

Beeville, Tex.—Precinct No. 1, Bee County, will vote Aug. 2 on $100,000 bonds for road construction; Precinct No. 2 will vote at same time on $25,000 bonds for road construction.—Dan Troy, Clerk District and County Courts.

Colorado, Tex.—Mitchell County will vote June 28 on $30,000 bonds for road improvement.

Dallas, Tex.—Board of Commissioners has ordered paving of Swiss ave., Preston, Elm and South Lamar sts. and Courthouse sq.—J. B. Winslett, City Secretary.

Dallas, Tex.—Board of Commissioners has ordered street paving at cost of $175,000.

Ft. Sam Houston, Tex.—Contracts will be let before June 30 for constructing several miles of macadamized road and cement sidewalks.

Martindale, Tex.—Precinct No. 2 has voted $40,000 bonds for road improvements.

Maypearl, Tex.—Road district has voted $25,000 bonds for road construction.

Rotan, Tex.—Plans and specifications have been received for grading and graveling 12 blocks on Siffder ave.

Ogden, Utah.—County will vote July 12 on tax for improvement of roads.—O. B. Madson, Chairman County Commissioners.

Norfolk, Va.—Council has appropriated, over Mayor's veto, $5,925 for paving on Main st., Berkley Ward.

Portsmouth, Va.—Street Committee has decided to ask Council for authority to

advertise for bids for between 80,000 and 100,000 yds. of smooth surface street paving, bids for resurfacing Crawford and 1st sts. and for concrete curbing.

Richmond, Va.—City will lay cement curbing and guttering in Oakwood; cost $1,200.—Charles E. Bolling, City Engineer.

Washington, Va.—Wakefield District of Rappahannock County will expend $30,000 to construct eight miles of macadam road; State Highway Commission, Richmond, Va., will have charge of construction.—W. C. Armstrong, Clerk.

Centralia, Wash.—Bids will be received in near future for paving of certain alleys.

Chehalis, Wash.—Council has passed resolution for paving of portion of Pacific ave.; cost $21,000.

Olympia, Wash.—Council has appropriated $1,650 for construction of roadway on west side.

Spokane, Wash.—Street improvements in various parts of the city, estimated to cost over $60,000, have been recommended by Board of Public Works.

Huntington, W. Va.—Board of Commissioners has instructed City Engineer to prepare plans for improving five streets.

Kenosha, Wis.—City Engineer R. H. Moth is preparing plans for brick or concrete paving, with asphalt filler, on Elizabeth st.

Milwaukee, Wis.—Council is considering $3,500 appropriation for third asphalt repair plant for use of Board of Public Works.

Racine, Wis.—Paving of Kinzie ave. is being urged.

Lachine, Que., Can.—Ratepayers have authorized Council to negotiate $125,000 loan for laying pavements and roadways within city limits.

St. John, N. B., Can.—Board of Works has decided to instruct engineer to call for tenders for laying of asphalt pavement on Germain st.

Monterey, Mex.—City will soon ask for bids for paving number of streets with asphalt.

CONTRACTS AWARDED

Ft. Rosecrans, Cal.—Constructing a 25-ft. disintegrated granite road, to Knight & Hyde Construction Co., $29,151.

Denver, Colo.—Improving Dist. No. 1, Arlington Park, to Pueblo Constr. Co., R. R. Bldg., $80,805; Gaffey & Keefe Constr. Co., $85,952, and J. Fred Roberts, $92,737. Alley Paving Dist. No. 21 to the National Const. Co., 435 Empire Bldg., $16,782.

New Haven, Conn.—Improved pavement: Dixwell ave., from Broadway to Munson st., to Rudolph S. Blome Co., 79 Dearborn st., Chicago, Ill., $22,080 and $260 extra for curbing; State st., wood blocks, to U. S. Wood Preserving Co., 165 Broadway, New York, $16,650 and $300 extra for curbing; Gregson st., granitoid blocks, to Rudolph S. Blome Co., $1,720 and $75 extra for curbing; portions of State st. and Congress ave., granite blocks, to A. J. Langegeld, Hartford, Conn., $3.49 per sq. yd.; Congress ave., wood blocks, U. S. Wood Preserving Co., $9,464.

Elgin, Ill.—Paving Spring st. with mineral rubber, to McCarthy Improvement Co., Davenport, Ia., $52,275.

Laporte, Ind.—Clear Lake macadam road, to Jacob Ackerman, $9,800.

Marion, Ind.—Soldiers' Home blvd. contract, to L. C. Lellard, $5.49 per lin. ft.

Michigan City, Ind.—Building Johnson macadam road, Porter County, to W. B. Hutchinson, $8,080.

Rushville, Ind.—Improvement of two streets, county, to Adams Contracting Co., Zanesville, O., $46,894 and $43,643.

Osage, Ia.—Paving, to Dearborn & Jackson, Cedar Rapids, 25,525 sq. yds. of pavement, $1.39 per sq. yd., and 7,360 ft. of curb, 51c. to 58c. per ft.; also 2,828 yds. of pavement and 800 lin. ft. of curb and 1,000 yds. of excavation and storm sewer.

Fort Riley, Kan.—Roads, to Henry Schaumburg, Junction City, for about 4,500 cu. yds. of grading for roadways, 6,600 sq. yds. of macadam road surface; to A. Wagner, Junction City, 3,900 lin. ft. of concrete curb and gutter, 110 ft. of concrete driveway curb, 6 concrete catch basins, 500 lin. ft. of 12-in. culvert pipe, 200 lin. ft. 10-in. culvert pipe, 8,000 sq. ft. concrete sidewalk, 950 sq. ft. of concrete walk road crossing, concrete steps.

Shreveport, La.—Paving, to cost about $600,000, to Hot Springs Concrete Co., Hot-Springs, Ark., about 40,000 yds. wood block, furnished by Gulfport Creosoting Co., Gulfport, Miss.; to Filbert Paving and Construction Co., Philadelphia, for 84,000 yds. paving, $75,000; large contract to Southern Bitulithic Co., Nashville, Tenn.; filbertine, wood block, granitoid and bitulithic to be used.—Geo. R. Wilson, City Engineer.

Port Deposit, Md.—Building McCann's Corner-Kamin road to Ward Brown, $45,-000.

Gloucester, Mass.—Building second section of Esplanade on Western ave., to A. C. Brown, $2,900.

Detroit, Mich.—Paving Cass ave. to T. E. Currie, Penn. Bank Bldg., $3.88 per sq. yd.; Chestnut st. to Jas. Hanley, 40 Fort st., $9,000.

Grand Rapids, Mich.—Grading and graveling Stone st. to Fred Gilner, $1,725.60; grading and paving Plainfield ave. to McDermott & Cooper, $16,577.28; grading and graveling Rebard ave. to L. C. Hilding, $11,782.90, and Neland ave to Kloote & Vander Veen, $8,740.70.

Grand Rapids, Mich.—Constructing cement walks and platform at city market, to Battjes Fuel and Building Material Co., 75c. per sq. yd.

Duluth, Minn.—Paving Garfield ave., to P. McDonnell, city, $99,625.

Duluth, Minn.—Paving Belknap ave. with creosoted wood block, to Kettle River Co.

St. Louis, Mo.—Paving, to Parker Washington Co., asphalt paving to cost $96,783; to Shrainka Construction Co., $24,389, various materials; to G. Eyermann & Bro., $46,606; to Frederick Ruecking, $8,440; to Granite Bituminous Paving Co., $8,206; to G. A. Heman, $114,740; to William H. Redemeyer, $30,480.

Elizabeth, N. J.—Oiling telford and macadam streets to Sands Oil Co.

Elizabeth, N. J.—Improvement of North Broad st. with bitulithic and macadam, to C. H. Winans Co., about $9,000.

Hackensack, N. J.—Repairing Paterson plank road, to Geo. F. Brackett, total cost $76,000.

Jersey City, N. J.—Improvement of Larch ave., to Henry Byrne, and Woodlawn ave., to Van Keuren & Sons.

Jersey City, N. J.—Street Improvements, Pearsall ave., to Van Keuren & Sons; Mallory ave., to Bernard Gannon; Richard and Colgate sts., to Philip Tumulty, and Neptune ave., to Henry Byrne.

Toms River, N. J.—Rebuilding road from Toms River to Lakewood, to Sutton & Corson, Ocean City, upper section, five miles, $3,960; to L. W. & F. T. Nolman, southern section, four miles, $7,974.

Albany, N. Y.—Contract No. 52, repairing sections 1, 2 and 3 of the Fabius-Apulia road, and county highways Nos. 49, 75 and 121, Onondaga County, to Joseph H. Conners & Co., of Fulton, $15,940; Contract No. 53, repairing Westlake County highway No. 48, and Marcellus-Marietta County highway No. 74, Onondaga County, to C. T. Hookway, Syracuse, $10,360; to Albert Gaffey, Syracuse, repairing Honeoye, Hemlock County highway No. 191, Ontario County, $6,660; to J. P. Cunningham, Plattsburg, repairing Watertown-Sackets Harbor-Henderson County highway No. 181, $21,960, and Redwood-Alexandria Bay highway, $1,164; repairing Cuyler County highway, Cortland County, to Chambers & Grady, Rochester, $2,807; two Cayuga County contracts were awarded to Brayer Bros, Auburn, Owasco County highway, $10,341.38, and Moravia-Niles highway, $17,907.30.

Brooklyn, N. Y.—Paving, as follows: Regulating and repaving, with granite pavement, concrete foundation, Johnson ave., to O'Grady Bros., 69 N. 8th st., Brooklyn, $41,078; other bidders, Newman & Carey Co., $41,117, and C. A. Meyers, $41,-525. Details follow: 10,440 sq. yds. granite pavement, one year's maintenance, $2.65; 45 sq. yds. old stone pavement, relaid, 50c.; 1,770 cu. yds. concrete, for pavement, found, $4.50; 4,810 lin. ft. new curbing, set in concrete, 80c.; 530 lin. ft. old curbing, reset in concrete, 75c.; 1,685 sq. ft. new granite bridgestones, 70c. Regulating and repaving with granite pavement, 3d st., to Norton & Gorman Co., 303 Douglass st., Brooklyn, $49,378; detailed bid as follows: 11,590 sq. yds. granite pavement, one year's maintenance, $2.75; 1,945 cu. yds. concrete, for pavement foundation, $5.40; 6,710 lin. ft. new curbing, set in concrete, 95c.; 100 lin. ft. old curbing, reset in concrete, 55c.; 635 sq. ft. new granite bridgestones, 85c.

Ft. H. G. Wright, N. Y.—Constructing roads and walks, to Michael O'Connell, New London, Conn., $9,100.

Plattsburg, N. Y.—Paving North Margaret st. and building of curbing on both sides, to George H. Gifford, Jamaica, L. I., concrete pavement, two courses, 90c. per sq. yd.; straight curb, 60c. per lin. ft.; curved curb, 70c. per lin. ft. Other bidders: James Conway, Plattsburg, concrete pavement, two courses, $1.20 per sq. yd.; curb, 65c. per lin. ft.; to Burdo & Facto, Plattsburg, straight curb, 49c. per lin. ft.; curved curb, 58c. per lin. ft.; other bidder: C. E. Goodsell, Burlington, straight curb, 54c. per lin. ft.; curved curb, 70c. per lin. ft.

Salamanca, N. Y.—Paving, to George M. Harris, Meadville.

Syracuse, N. Y.—Paving Dewitt st. with asphalt and stone curb, $6,679.90, and Oxford st., same material, $6,150.75, to F. J. Baker.

Utica, N. Y.—Paving wtih asphalt, stone curb, to Barber Asphalt Co., Downer ave., $10,819.80, and McQuade ave., $8,984.85.

Yonkers, N. Y.—Improvement of Dock st., to Barbour Paving Co., $4,197.36.

Barberton, O.—Paving of Third st. is being urged by Councilman J. Miller.

Cincinnati, O.—Paving Livingston ave., eastern end, granite, to A. J. Brehm Co., $12,524; western end, asphalt, to Barber Asphalt Co., $4,064.

Dayton, O.—Grading and graveling Reasor ave., to Sellers & Schmitthauer, $4,-031.50.

Mansfield, O.—Paving, as follows: W. 4th st., with brick and asphalt filler, to Gandert Bros., $26,710; Franklin ave., roadway with brick, tar filler, to Herring & Sons, $9,491.

Mansfield, O.—Piking Lexington ave. road and grading lower Lucas road, to Gettings Bros.; furnishing tile for Wooster road to Rusk road.

Wakeman, O.—Grading Schaffer Hill, to Ralph W. Brown, Norwalk, 23c. per cu. yd. for excavating in road, and 27c. per cu. yd. for excavating in channel.

Altoona, Pa.—Repairing pavements for period of three years, to Bell-Bockel Stone Co., as follows: Metropolitan paving, with asphalt filler, $3.07 per sq. yd.; with grout filler, $2.87; macadamized blocks, $2.85; macadam, $1.30; cobblestone road, $1.52; stone block paving, $3.10; asphalt blocks, $3.57; special brick paving, $2.95; Bessemer, Penn and Johnsonburg blocks, $2.85.

Ashland, Pa.—Paving, to Coryell Construction Co., Williamsport, $2.18 per sq. yd.

North York, Pa.—Furnishing stone for macadamizing streets, to York Stone and Supply Co., $1.15 per perch of 2,500 lbs. for all grades of stone, spread on streets.

York, Pa.—Paving Richfield ave. with asphalt, to Filbert Paving Co., $1.78 per sq. yd.

Abilene, Tex.—Cement sidewalks, 55,000 ft., to Hughes, Sayles & Robertson.

San Antonio, Tex.—Street grading at San José, to Kelly Bros.

Stamford, Tex.—Paving, 6,000 yds. with compressed concrete, to Ockander Bros., Dallas.

Emporia, Va.—Constructing 28 miles of road, to T. W. Chandler & Bro., Virginia.

Spokane, Wash.—Improving 2d ave. to John Fife, $81,810.

Tacoma, Wash.—Grading N. 14th and 16th sts., to Lester Construction Co., $2,184.

Wenatchee, Wash.—Paving Union st. to Allyn & McNerney.

Clarksburg, W. Va.—Paving Traders alley to H. C. Brooks Co.

Beloit, Wis.—Construction of city walks, to Geo. Welch, 11½c. per sq. ft.; excavation, 60c. per cu. yd.

Superior, Wis.—Paving with brick Belknap st., to E. Johnson, $67,005.

Ottawa, Ont., Can.—Paving Bank and St. Patrick sts. to Barber Asphalt Paving Co., for $37,565 and $45,750; bids were as follows: Barber Asphalt Paving Co., $37,565; Ottawa Construction Co., $37,989; Union Con. Co., $41,764.55; City Engineer, $47,673. St. Patrick st.: Barber Asphalt Paving Co., $45,750; Ottawa Construction Co., $49,495; Union Construction Co., $50,750; City Engineer, $59,522.70.

BIDS RECEIVED

Los Angeles, Cal.—Constructing Los Angeles-Inglewood-Hermosa Beach boulevard, Garnsey & Pitzer, $12,998.24 for grading and culverts on section 1, and $6,897.45 on section 2; laying macadam, $1.69 per ton; section 1, 25,232 tons will be required and 9,272 tons for section 2; A. C. St. John, $12,000 and $5,600, respectively, for grading and culverts, and $1.75 per ton for laying macadam on section 1 and $1.65 on section 2; Long Beach boulevard, Oil Macadam Paving Co., $1,935 for grading and culverts on section 1, $1,840 for section 2, and $1.75 per ton for laying 6,439 tons of rock macadam; Doran, Broose & Price, $6,479.76, $9,263.75 and $1.31, respectively, for the same items; improving 47,353 ft. of San Fernando road up to Burbank, Peter Walker, $16,055 for grading and culverts, and $1.48 per ton for laying 34,478 tons of rock; A. C. St. John, $28,100, for grading and culverts, and $1.65 per ton for laying rock.

Stockton, Cal.—Macadamizing road, Cyrus Moreing, Sr., lowest bidder, as follows: Waterloo road, 10½ miles, $57,779; Linden road, 10½ miles, $41,075; French Camp road, 4½ miles, $12,079; West Side road No. 1, $17,779; West Side road No. 2, 11½ miles, $74,294.

New Britain, Conn.—Paving: Connecticut Hassam Pavement Co., New Haven, Mack brick on 5-in. concrete base, $2.74 per sq. yd.; Hassam pavement, $1.75 per sq. yd.; Warren Brothers, Boston, 25,000 sq. yds. bitulithic, $2.47 per sq. yd.; Bessemer Limestone Co., Youngstown, O., sent guarantee of any material they furnish contractors, but named no prices; Fields, Barker & Underwood, Philadelphia, Mack brick, $2.73 per sq. yd., Bessemer $2.78. Metropolitan $2.85; Peter Suzio & Co., Hartford, $2.90 per sq. yd. for any brick; Robert W. Hen-

Seattle, Wash.—Bids were received May 20 for improving Federal ave., and other streets from: (A) Independent Asphalt Paving Co., Third ave. and Cherry st., City; (B) F. McLellan, Burke Bldg., City (awarded contract); (C) Barber Asphalt Paving Co., White Bldg., City; (D) P. J. McHugh, City.—R. H. Thomson, City Engineer.

	(A)	(B)	(C)	(D)
Abstract of title—fixed estimate	$6,000.00	$6,000.00	$6,000.00	$6,000.00
Clear and grub., lump sum	500.00	3,000.00	5,500.00	1,000.00
26,000 cu. yds sub-grading	.35	.31	.45	.50
23,324 lin. ft. curb, straight concrete	.33	.33	.30	.30
7,883 lin. ft. curb, armored concrete	.58	.60	.60	.60
5,100 lin. ft. curb, curved concrete	.58	.65	.65	.65
38,172 sq. yds. paving, asphalt	1.60	1.60	1.60	1.70
11,874 sq. yds. paving, brick	2.70	2.50	2.55	2.80
1,222 sq. yds. paving, brick block	2.70	2.50	2.70	2.85
4,960 sq. yds. paving, sandstone block	3.50	3.50	3.45	3.60
4,960 sq. yds. paving, granite block alt	3.75	3.70	3.90	3.85
679 sq. yds. gutter, brick	2.70	2.50	3.00	2.80
101 sq. yds. alley crossings, concrete	1.40	1.20	1.30	1.25
21 sq. yds. alley crossings, brick	2.70	2.50	3.00	2.80
1,164 sq. yds. concrete walks	1.08	1.00	1.00	1.00
200 sq. yds. concrete walks, repairing	1.20	1.10	1.15	1.25
448 lin. ft. wooden stops	.35	.40	.40	.40
20 catch basins, 1 inlet	55.00	50.00	65.00	60.00
5 catch basins, 2 inlets	60.00	65.00	75.00	70.00
2 catch basins, 1 inlet, moved	15.00	23.00	30.00	25.00
2 single inlets	12.00	15.00	12.50	15.00
33 inlets moved	3.00	5.00	5.00	3.00
20 inlets adjusted	3.00	3.00	5.00	3.00
7 curb inlets	8.00	7.00	8.00	12.00
81 adjusting catch basins and manhole covers	2.00	3.00	3.00	2.00
36 monument cases	8.00	8.00	7.00	8.00
5 brick gate chambers, standard	30.00	40.00	30.00	35.00
4 brick gate chambers, large	40.00	48.00	40.00	45.00
790 cu. yds. concrete for retaining wall	8.00	7.00	8.50	9.00
5 M. ft. wood bulkhead lumber	25.00	20.00	25.00	25.00
1,000 lbs. bulkhead iron	.06	.05	.18	.09
13 hydrants	80.00	85.00	75.00	80.00
60 lin. ft. 6-in. c.-i. pipe	1.00	1.10	1.50	1.40
4 hydrants reset	25.00	20.00	25.00	25.00
500 lin. ft. hydrant extensions	.10	.06	.10	.07
500 lin. ft. galvanized pipe, ¾-in.	.40	.35	.50	.40
1,300 lbs. special castings	.05	.06	.10	.07
200 lbs. shackle rods	.06	.06	.20	.09
10 cu. yds. extra excavation	.80	.50	1.00	5.00
2 cu. yds. concrete	12.00	7.00	10.00	7.50
476 lin. ft. pipe sewer, 8-in.	1.40	1.50	1.50	1.10
30 ft. 7x10-in. box sewer	1.00	.70	3.00	.75
2 manholes, 3½ ft.	55.00	60.00	60.00	45.00
4,060 lin. ft. 6-in. side sewer connections	.90	1.00	1.15	1.00
220 lin. ft. 3-in. sewer pipe	.20	.25	.20	.15
400 lin. ft. 3-in. tile drain	.15	.10	.20	.15
2 sand boxes	20.00	30.00	35.00	25.00
5 cu. yds. rock pockets	3.00	1.00	3.00	2.00
Totals:				
Sandstone	$158,689	$158,217	$166,163	$169,370
Granite	159,929	159,209	168,395	170,610

Paterson, N. J.—Bids received for permanent street paving.

	Asphalt	Asphalt Macadam	Wood Block	Medina Block	Hassam
PARK AVENUE:					
George McDonald	$2.27	$2.27	$2.97	$3.39	$2.25
Barber Asphalt Co.	2.48½	2.32	3.37	....	....
Empire City Construction Co.	....	....	2.80	3.50	....
George F. Brackett	2.47	2.47	3.00	3.10	....
Hassam Paving Co.	....	....	....	....	1.70
RIVER STREET:					
George McDonald	$1.91	$1.91	....	$3.39	$2.25
Barber Asphalt Co.	2.12½	1.95	....	....	....
Empire City Construction Co.	....	....	....	3.50	....
George F. Brackett	2.41	2.47	....	3.10	....
Hassam Paving Co.	....	....	....	....	1.75
MILL STREET:					
George McDonald	....	$1.91	....	$3.39	$2.25
Barber Asphalt Co.	....	1.87½	....	....	....
Empire City Construction Co.	....	....	....	3.50	....
Hassam Paving Co.	....	....	....	....	1.75

son, Geneva, N. Y., Bessemer shale block $2.37, Clearfield brick $2.42, Bessemer clay pavement $2.27, and Bessemer fire clay block $2.37; U. S. Wood Block Co., $1.85 for 3-in. blocks, $2.05 for 3½-in. blocks; figures for blocks only, not including cost of laying; estimated cost per square yard of the completed pavement $3.05 to $3.25, according to size of blocks used; American Creosoting Co., $1.75 for 3-in. blocks and $1.95 for 3½-in. blocks; cost of finished pavement $3 to $3.20, according to size of block.

Dover, Del.—Paving Bradford and Division sts. and Governor's ave.: Excavations, per cu. yd., from 28c. to 60c.; macadam, from 69c. to $1.05 surface sq. yd.; tarvia, from 89c. to $1.30; hauling beyond 2,000 ft., from 10c. to 60c.; bidders were the United Paving Co., Atlantic City, N. J.; Nelson Merydith, Chambersburg, Pa.; Commonwealth Construction Co., New York; John A. Clark, Wilmington; B. F. Wyckersham, Kennett Square, Pa.; Jas. A. Hirons and J. A. Stewart, Dover; Dover Lumber and Milling Co., Horrigan Contracting Co., Wilmington, and Lon W. Clifton, Dover.

Duluth, Minn.—Paving Garfield ave., P. McDonnell, lowest bidder: Sandstone blocks from lower end of the viaduct to the approach of interstate bridge, $99,635.58; with granite between the street car tracks and remainder paved with sandstone, $101,948.78.

Hackensack, N. J.—Improving Paterson plank road: Union Bridge & Const. Co., of Passaic, $95,416; Wm. Van Keuren, of Jersey City, $91,060, and Geo. M. Brewster Const. Co., of Hackensack, $88,050.

Brooklyn, N. Y.—Repaving with granite on Grand st., M. T. Meagher lowest bidder, as follows: 7,390 sq. yds. granite pavement, outside of railroad area, one year's maintenance, $2.75; 1,420 sq. yds. granite pavement, railroad area, no maintenance, $2.75; 1,230 cu. yds. concrete pavement found., outside railroad area, $4.50; 235 cu. yds., within railroad area, $4.50; 4,575 lin. ft. new curbing, set in concrete, 90c.; 1,145 lin. ft. old curbing, 40c.; 420 sq. ft. old bridgestone, relaid, 30c.; total, $35,531. Other bids received were: H. P. George, Richmond Hill, L. I., $37,726, and Richard L. Russell, 44 Court st., $38,966.

Dunkirk, N. Y.—Resurfacing three streets with asphalt: H. P. Burgard Co., Buffalo, lowest on W. 4th & Swann sts., Henry Mayer, Sr., Erie, Pa., lowest on Fox st.

Long Island City, N. Y.—Street work, lowest bidders: Paving 2,100 sq. yds. asphalt block on Academy st., Hastings Paving Co., $5,306; repairing and maintaining 16,000 sq. yds. sheet asphalt paving in Borough Queens, Eastern Asphalt Paving Co., $16,450; new flagstone sidewalks, etc., on Prospect and William sts., Wm. F. Cunningham, $6,759 for the former, and Greene Const. Co., $7,752, the latter.

Portsmouth, O.—Paving 3d st.: Concrete base and tar filler, Monroe & Sons, Portsmouth, Portsmouth block, $30,582; Kelly Bros., Peebles block, $31,194; J. A. Grimes, Portsmouth, Portsmouth block, $36,704; Kaps Bros., Portsmouth block, $32,088. Concrete base and sand filler, Monroe & Son, granite block, $29,761; Kelly Bros., Peebles or granite block, $29,347; Kaps Bros., Portsmouth block, $31,062. Gravel base, tar filler, Monroe & Son, Portsmouth or granite block, $27,914; Kelly Bros., Peebles or granite block, $28,526. Gravel base and filler, Monroe & Son, Portsmouth or granite block, $27,298; Kelly Bros., Peebles block, $26,884. McConnell ave., concrete base, tar filler, Kaps Bros., Portsmouth block, $5,292; J. A. Grimes, Portsmouth block, $5,885; Monroe & Son, Portsmouth block, $4,953; Kelly Bros., Peebles block, $4,956. Concrete base, sand filler, Kaps Bros., Portsmouth block, $5,127; Monroe & Son, Portsmouth block, $4,821; Kelly Bros., Peebles block, $4,725. Gravel base, tar filler, Monroe & Son, Portsmouth block, $4,524; Kelly Bros., Peebles block, $4,559. Gravel base, sand filler, Monroe & Son, Portsmouth block, $4,425; Kelly Bros., Peebles block, $4,329.

York, Pa.—Paving Manchester st.: Filbert Paving & Construction Co., sheet asphalt $1.78, brick $2.15; Standard Bitulithic Co., bitulithic $2.22; Barber Asphalt Paving Co., $1.72. W. Philadelphia st., Filbert Paving & Construction Co., asphalt $1.78, brick $2.15; Standard Bitulithic Co., bitulithic $2.22; Barber Asphalt Paving Co., asphalt $1.74. Richland ave., Filbert Paving & Construction Co., asphalt $1.78; Barber Asphalt Paving Co., asphalt $1.74. Madison ave., Filbert Paving & Construction Co., asphalt $1.78; Barber Asphalt Paving Co., asphalt $1.74; General Construction & Supply Co., asphalt $1.70. South George st., Filbert Paving & Construction Co., asphalt $1.78, brick $2.15; Barber Asphalt Paving Co., asphalt $1.77; Standard Bitulithic Co., bitulithic $2.24. Carlisle ave., Filbert Paving & Construction Co., asphalt $1.78, brick $2.15; Standard Bitulithic Co., bitulithic $2.22; Barber Asphalt Paving Co., asphalt $1.78. Cherry alley, Filbert Paving & Construction Co., asphalt $1.78, brick $2.25; Barber Asphalt Paving Co., asphalt $1.71. W. Princess st., Standard Bitulithic Co., bitulithic $2.24. E. College ave., Standard Bitulithic Co., bitulithic $2.24.

Charleston, S. C.—Paving and curbing Custom House grounds, Charleston Engineering & Contr. Co. lowest bidder, $6,864.

Fredricksburg, Va.— Constructing 3 miles of gravel roads, Tidewater Construction Co., Newport, lowest bidder, $110,000.

Tacoma, Wash.—Paving portions of South L, S. 8th, S. 9th and S. 10th sts.; Independent Asphalt Paving Co., $51,443; Warter Bros., $54,500; Anderson Const. Co., $56,696; B. W. Kibler, $58,600; N. A. Jones, $56,333; Coast Contracting Co., $52,190; Barber Asphalt Paving Co., $50,264.

Nanaimo, B. C., Can.—Construction of concrete walks, W. H. Worsick, Victoria, lowest bidder: Retaining walls, per cu. yd., $4.50; filling, per cu. yd., 45c.; cement concrete sidewalks, 1-in. concrete sidewalks, ¾-in. finish, per yd. super., $1.24; ordinary excavation, per cu. yd., 20c.; rock excavation, per cu. yd., $1.50; laying and jointing 4-in. vitrified pipes, per lin. ft., 30c., up to 4 ft. in depth, but not in rock; laying 4-in. tile drains, per lin. ft., 10c.

SEWERAGE

Oakland, Cal.—Drainage and Sanitary Committee is considering matter of sewerage on Grand st.; also improvement of storm water system in Piedmont.

Oakland, Cal.—Board of Public Works has ordered bids advertised for constructing storm sewer in Bay place.

Tulare, Cal.—Citizens have voted $80,000 bonds for construction of sewer system.

Norwich, Conn.—Construction of sewers in Furnace and Water sts. has been ordered.

Georgetown, Del.—Residents of Blades have secured permission from County Commissioners to lay sewer pipes through town to Nanticoke River.

Milton, Fla.—City will soon have plans drawn for construction of sewer system; $5,000 bonds available.—W. Clark, Mayor.

St. Petersburg, Fla.—City will vote July 19 on $5,000 bonds for improvement of eswerage system.

Savannah, Ga.—City Engineer Howard has estimated cost of proposed house drainage extensions at $382,919.

Hoopeston, Ill.—City Engineer Frank Payne has submitted final drawings for proposed sewer system; cost about $45,000.

Lewiston, Ill.—Board of Local Improvements has passed resolutions to construct sewer in north and in south ends of town.

Burlington, Ia.—City did not receive any bids for furnishing the city with sewer pipe for remainder of the fiscal year ending May 31, 1911.—Robert Kroppach, City Clerk.

Council Bluffs, Ia.—Council has decided to construct 15-in. sewer on 16th ave., 8-in. sewers on four streets and 12-in. on 3d st.—A. W. Casady, City Clerk.

Hutchinson, Kan.—Council has decided

to extend sewer that now empties into Cow Creek at Elmdale Park.

North Topeka, Kan.—Plans are being prepared for construction of sewer in First Ward.

Princess Anne, Md.—Town has defeated proposition to issue $25,000 bonds for installation of sewerage system and improvement of water works.

Lowell, Mass.—Board of Aldermen has decided to construct sewers in three streets.

New Bedford, Mass.—Council has appropriated $50,000 for work on intercepting sewer.

Taunton, Mass.—Sewer Commissioners have voted to construct lateral sewers on Friend, Shores, Kilton and Pine sts.

Grand Rapids, Mich.—Board of Public Works has estimated cost of constructing sewer in Ames st. at $1,010, and in N. Lafayette st., at $1,225.—S. A. Freshney, Secretary.

Kalamazoo, Mich.—City Engineer Johnson has been instructed to submit estimates of cost of constructing proposed sanitary zone sewer pumping station, connecting water tower with city mains and of trunk storm and sanitary sewer on Fulford st.

Duluth, Minn.—City will build from 25 to 30 sanitary sewers during year.

Meridian, Miss.—City is considering issuance of $50,000 bonds for improvement of surface and storm drainage system, including laying pipes, building conduits, culverts, bridges, etc.; also $10,000 of bonds for extending and improving sanitary sewer system.—W. G. Wetmore, City Engineer.

St. Joseph, Mo.—Board of Works has ordered construction of sewers in District 114.

Springfield, Mo.—Mayor R. E. Lee has recommended issuance of $50,000 bonds for proposed septic tanks and $10,000 for street improvement and drainage.

Billings, Mont.—Council has created special improvement district No. 54 for construction of concrete gutters, catch basins and storm sewers.—J. D. Matheson, City Clerk.

Belleville, N. J.—Township Committee has instructed Township Engineer Frank D. Shephard to obtain data needed for construction of proposed sewer.

Haddon Heights, N. J.—Citizens will vote June 28 on $44,000 bonds to install sewage disposal system.

Long Branch, N. J.—Council is considering construction of sewer along Shrewsbury River.

Trenton, N. J.—Council has ordered construction of sewers in six streets.—H. B. Salter, City Clerk.

Binghamton, N. Y.—Council has decided to construct sewers on Gold and Alice sts.

Corning, N. Y.—Chamber of Commerce will engage engineer to prepare plans for installation of sewer system.

Niagara Falls, N. Y.—City Engineer McClanathan has estimated cost of constructing sewer in northern part of city at $100,000.

Oswego, N. Y.—City is considering $150,000 bond issue for construction of new main trunk sewers and a sewage disposal plant.

Carrington, N. D.—Plans and specifications have been completed for complete sewer system.

Fostoria, O.—City is considering issuance of $40,000 bonds to enlarge municipal sewage disposal plant.

Warren, O.—Construction of a pipe sewer to cost $20,000 is being considered.—H. C. Baldwin, Director Board Public Service.

Guthrie, Okla.—Council is considering construction of sanitary sewer in Egg addition.

Lawton, Okla.—City is considering constructing one mile of storm sewers and four miles of sanitary sewers.—W. R. Julian, City Clerk.

Salem, Ore.—City will let contracts very soon for approximately $270,000 worth of new sewers and sewer extensions.

Altoona, Pa.—Council has appointed committee to consider methods of disposal of sewage; election on $260,000 bonds for sewer, street and bridge improvements is being considered. Common Councilmen Reilly and Merk are interested.

Chambersburg, Pa.—Citizens will vote on $65,000 bonds for sewer system and disposal plant.

Donora, Pa.—Engineer E. J. Ijams, First National Bank Bldg., is preparing plans and specifications for sewerage system and disposal plant.—Geo. W. Allen, Borough Secretary.

Edwardsville, Pa.—Council is considering construction of sewer on Plymouth st.

Erie, Pa.—Council has passed ordinance for construction of 9-in. sewer in Cromwell and 22d sts.

Oil City, Pa.—Bids will be received June 20 for $50,000 bonds for sewer and street improvements.

Mart, Tex.—Council is considering granting of franchise for sewer system.

Pocatello, Utah.—Council has ordered election on June 28 on bonds for construction of a sewerage system.

Salt Lake City, Utah.—City Council has called bond election on June 28 for construction of city sewer system; cost $164,788.

Chehalis, Wash.—City has perfected plans for public improvements; cost $200,000; sewer system will cost $80,000.

De Pere, Wis.—Council has ordered construction of sewer on Marsh and N. 8th sts.

Kenosha, Wis.—City Engineer R. H. Moth is preparing plans for tile sewers in five streets.

Shawnee, Wis.—Council has accepted report of the Street Committee in regard to the extension of sewer system in various wards.

Stoughton, Wis.—Plans have been approved for sewerage system.—John T. Hard, City Engineer.

Chilliwack, B. C., Can.—Ratepayers will vote on by-law to authorize expenditure of $70,000 for drainage system.

Fairville, N. B., Can.—Ratepayers will vote on installation of sewerage system.

Medicine Hat, Alta., Can.—Terra cotta sewers will be constructed at a cost of $35,000, city to do the work.—A. K. Grimmer, City Engineer.

CONTRACTS AWARDED

Little Rock, Ark.—Rebuilding Ashley st. sewer, to William P. Funston.

San Francisco, Cal.—Sewer, to Metropolitan Construction Co., $165,000.

Macon, Ga.—Constructing auxiliary system to sewers, to R. S. Clemens & Co., city, $5,632.18 per mile. Other bidders: Municipal Engineering Co., $9,441.25; A. L. Patterson & Co., $8,408.26; Sullivan & Long, $6,006.15; Dysard Construction Co., $6,332.15; H. S. Bosler, $6,903.16; Bryan & Co., $6,027.40; McPoland & O'Gara, $5,684.10.

Centralia, Ill.—Addition to sewer system, to Willard Bros., $1,501.49.

Cedar Falls, Ia.—Sewers, to U. D. Yeager, Cedar Rapids, $2,891; Kennedy & Shirley, Dubuque, $4,427.

Waukon, Ia.—Sewer system, to Thill-Manning Whalen Co., La Crosse, Wis., $20,174; to John A. Dohkad, city, for disposal plant.

Coffeyville, Kan.—Sewer, to Stanton & McGuire Construction Co., $2,357.

Lexington, Ky.—Sanitary sewers on two streets, to Jos. Melvin & Co.

New Orleans, La.—Subsurface drainage system in Julia st., to J. A. Craven & Co., city.

Westfield, Mass.—Constructing 4,860 ft. 6to 20-in. sewer, to E. M. Denoon & Co., Springfield, $6,515, as follows: 450 lin. ft. 61in. pipe, trench and lay, 50c.; 325 lin. ft. 20-in., $1; 1,036 lin. ft. 18-in., $1; 1,649 lin. ft. 15-in., $1; 750 lin. ft. 12-in., 85c.; 350 lin. ft. 10-in., 85c.; 300 lin. ft. 8-in., 65c.; 130 cu. yds. brick masonry, $15; 20 cu. yds. concrete masonry, $10.

Syracuse, N. Y.—Sewer system in three streets, to Albert Gafney, $1,868.30.

Walters, Okla.—Constructing sewer and water system, to C. A. Reese, Tahlequah. $66,356.50.

Gaffney, S. C.—Sewerage system, to Guild & Co., Chattanooga, Tenn.

Knoxville, Tenn.—Sanitary sewer on Schneider st., to Jas. A. Hannifin.

Morristown, Tenn.—Building 8½ miles of sewers, to Edwards Construction Co., Hickory, N. C.; to Municipal Engineering and Construction Co., Chattanooga, Tenn., to construct outfall and disposal plant; cost $40,000.—Chas. E. Collins, Drexel Bldg., Philadelphia, Pa., Consulting Engineer.

Corliss, Wis.—Construction of sewer system, from plans of the W. S. Shields Engineering Co., of Chicago, Ill., to N. F. Reichert, Racine, about $9,000.

BIDS RECEIVED

Baltimore, Md.—Constructing sanitary lateral sewers, District 19-A: William McCarthy & Co., Pittsburg, Pa., $105,878; B. F. Sweeten & Son, Baltimore, $110,005; D. V. Ault & Co., Baltimore, $122,639; Irwin Bros., Baltimore, $135,654.—Calvin W. Hendrick, Chief Engineer Sewer Commission, American Bldg.

Boston, Mass.—Seventh section of Stony Brook sewer conduit in West Roxbury, bidders were W. J. Barry, $75,326.50; Chas. R. Gow Co., $82,105; Antony Cefalo, $83,553.50; Bruno & Petitti, $83,623.25; Coughlan & Shiels, $84,928.91; Coleman Bros., $85,610.50; McCarthy & Walsh, $87,167.10; Jones & Meehan, $89,572; John J. Falvey, $89,774.50; Metropolitan Construction Co., $90,595.25; P. W. Hill, $93,221, and Luke D. Mullen, $93,224.

Boston, Mass.—Constructing Stony Brook sewer conduit in Raslindale section: G. R. Gow Co., $40,770; Bryne Constr. Co., $42,091; McCarthy & Walsh, $43,920; A. Ceffalo, $44,449; P. W. Hill, $46,365; Luke D. Mullen, $51,292; J. J. Falvey, $52,917; J. H. Ferguson, $57,507.60, and J. E. Palmer, $74,272.

Plainfield, N. J.—Construction of sanitary sewers in two streets: A. Colucci, lowest bidder as follows: sewers under 6 ft. deep, 42c.; 6 to 8 ft., 50c.; gravel, 8 to 10 ft., 61c.; clay, etc., 10 to 12 ft., 69c.; manholes, $43; branches, 53c.; flush tanks, $65, 4-in. house connections, 28c.; total, $3,279.30; Charles A. Peterson, Plainfield, $3,554; Jersey Paving Corporation, Newark, $3,621; T. Foster Callahan, Elizabeth, $3,728; Joseph Wade, Elizabeth, $3,755; Garafano & Mezzino, Summit, $3,783; Louis Jaques, Elizabeth, $3,805; Eveline Brothers, Waterford, N. Y., $4,016; J. C. Schrade, Williamsport, Pa., $4,395; J. G. Montgomery & Co., Jersey City, $4,662.

South Orange, N. J.—Tile sewers, 6,000 ft. 8-in. pipe, macadam paving, to be excavated and relaid, Mule & Bruno, lowest bidders, 77c.; mean of all bids $1; manholes, $39; rock excavation, $1.50; sheathing left in trench, $30 per M.; flush tanks, $1.—E. R. Halsey, Township Engineer.

WATER SUPPLY

Conway, Ark.—City has employed Dickinson & Watkins, Southern Trust Bldg., Little Rock, to supervise construction of proposed water works system; cost $75,000.—G. W. A. Wilson, Secretary Water Board.

Alameda, Cal.—Alfred Bannister, Consulting Engineer, employed by city to work with City Engineer I. N. Chapman on Bay Cities Water Co. proposition, has estimated cost of installing distributing system at $827,000.

Corning, Cal.—Chamber of Commerce is considering proposed water system and sewage plans for city; two engineers will be engaged to make estimates on the installation of the systems.

San Francisco, Cal.—Board of Fire Commissioners has approved plan to bring pipe lines from 100,000-gal. reservoir in Golden Gate Park and to erect hydrants along Stanyan st.

Vallejo, Cal.—Board of Public Works will have estimates prepared for construction of 12,000,000-gal. reservoir to use in connection with present distributing system on Fleming Hill, also for repairs to Fleming Hill reservoir, and for pipe line from it to South Vallejo.

Dunnellon, Fla.—City will rebuild power plant destroyed by fire, furnishing power for both water and electric light plants.

Key West, Fla.—Cost of repairing pumping station has been estimated at $15,000.

St. Petersburg, Fla.—Citizens will vote July 19 on $10,000 bonds for improvement and extension of water works.

Atlanta, Ga.—City will purchase additional pumping machinery for water works; cost $7,645.

Montezuma, Ga.—Citizens will vote July 5 on $6,000 bonds for erection of water tank, including foundation and necessary connections with present system of water works.—J. P. Walker, Mayor.

Huntley, Ill.—Village Council has passed ordinances for water main extensions.

Rossville, Ill.—Installation of complete new water plant is being considered.

Winfield, Ia.—Citizens have voted $20,000 bonds for installation of a water works system.

Clay Center, Kan.—Public Utilities Commission will purchase 750,000-gal. pump for direct pressure.—C. F. Rasmussen, Superintendent.

Elkton, Md.—Citizens will vote July 11 on $50,000 bonds for water and light plant.

Hancock, Md.—Plans are being prepared by Pennington & Farley, Baltimore, for construction of proposed water works.

Greenfield, Mass.—Citizens have defeated proposition to build $75,000 water storage basin.

Holyoke, Mass.—City proposes to construct storage reservoir at the former watershed; preliminary surveys are now being made.—Jas. L. Tighe, City Engineer.

Saugus, Mass.—Town will vote June 23 on loan for extension of water system.

Green Bay, Mich.—City will drill 20-in. well, install 1,000-gal. per minute pump and construct 300,000-gal. reservoir.

Ionia, Mich.—Citizens have voted $50,000 bonds for construction of water works.

St. Paul, Minn.—Water Board has ordered laying of 12,870 ft. of 6-in. water pipe.

Oxford, Miss.—Citizens have voted $30,000 bonds for extension of water and electric light systems.

Kirksville, Mo.—City will employ engineer to recommend improvements to supply. Prof. W. A. Lewis is interested.

St. Joseph, Mo.—Board of Public Works has ordered laying of water mains in portions of six streets.

Hardy, Neb.—Citizens have voted $17,000 bonds for water works.

Omaha, Neb.—Assistant City Engineer Campen has recommended use of meters.

Rushville, Neb.—Citizens have voted $15,-

000 bonds for construction of water works.

Tonopah, Nev.—City will construct reservoir for fire protection.

Caldwell, N. J.—Water Committee will ascertain cost of driven well on Forest ave.; establishment of water supply being considered.

Fords, N. J.—Residents are considering water question.

Paulsboro, N. J.—Citizens have defeated proposition to issue $50,000 bonds to purchase water works.—Wm. Adamson, Mayor.

Roselle Park, N. J.—Construction of municipal water plant for twin boroughs has been advised by the Health Inspector.

Corning, N. Y.—New York State Department of Health has recommended that question of quality and possible improvements to water supply of Corning be completely and scientifically investigated by expert sanitary engineer of unquestionable reputation.

Crogham, N. Y.—Town is considering installation of water plant; $30,000 available.

Ellenville, N. Y.—Bids will be received June 20, 2 p. m., for $1,000 bonds for improving water supply.—Wm. Booth, Sr., President Village Trustees.

Rome, N. Y.—City has sold $25,000 Fish Creek water bonds.

Roslyn, L. I., N. Y.—Plans and specifications for the construction of water plant in this city are being prepared.—W. E. Sexton, Mineola, Engineer Roslyn Water District.

Elizabeth City, N. C.—W. A. Greenleaf desires prices on 1,000, 2,000 and 3,000 ft. c.-i. pipe.

Amherst, O.—City will issue $100,000 bonds for construction of water plant.

Carnegie, Okla.—The Oklahoma Engineering Co., Anadarko, is preparing plans and specifications for water works system; cost is $20,000.

Kaw City, Okla.—Citizens will vote on bonds for installation of water system.

Chambersburg, Pa.—Citizens will vote on $150 000 bonds for installation of gravity water system.

Myerstown, Pa.—Myerstown Water Co. will lay 8-in. pipe line from springs to connect with main near toll gate on West Main st.

Oxford, Pa.—Council has decided to sink 800-ft. well.

Belfield, S. D.—Installation of water system is being considered

Philip, S. D.—Citizens have voted $13,000 bonds to construct water works; bids for the construction are to be received at once.—N. S. Anderson, City Auditor.

Livingston, Tenn.—Livingston Light & Power Co. will purchase 350 ft. 22-in. pipe. —H. E. Speyer, President.

Lonsdale, Tenn.—Board of Aldermen will secure levels on Tillery Spring, in Sharp's Gap, with view to building water plant.

Ft. Sam Houston, Tex.—Contracts will be let before June 30 for erection of 300,000-gal. water tank.

Houston, Tex.—Plans are being prepared for laying 12-in. water mains in business district.

Layton, Utah.—Citizens are considering purchase of certain springs east of town from the Holmes Creek Irrigation Co. and installing water system.—Jesse M. Smith, E. M. Whitesides, George W. Layton, C. J Weaver and Morris H. Ellison, Committee.

Norfolk, Va.—Council has voted $15,000 as loan to Seventh Ward for water main extensions.

Orange, Va.—Town has voted $10,000 additional bonds for completing water works.

Quincy, Wash.—Engineer Jos. Jacobs, 406 Central Bldg., Seattle, has completed plans for proposed system of Quincy Valley Water Users' Association; estimated cost $28,672,782; work includes pipe line and cement line syphon 100 ft. below the Columbia River; cost about $3,600,000.—A. J. Ternent, Morrison, Utah, Secretary-Treasurer.

Spokane, Wash.—Board of Public Works has estimated cost of constructing water mains on 33d ave. at $1,146.85.

Walla Walla, Wash.—Council has ordered laying of water mains on Figueroa st.—T. D. S. Hart, City Clerk.

Sheboygan, Wis.—City will expend $50,000 for purchase of pump.

Montreal, Que., Can.—City Surveyor is considering extension of water works system on Queslin st.

St. John, N. B., Can.—City is considering extension of water works at cost of $38,000.

Toronto, Ont., Can.—City Engineer has been ordered to lay mains and install additional hydrants in Queen's Park; estimated cost $9,000.

Toronto, Ont., Can.—Water Works Department is considering purchase of meters, to cost $20,000.

CONTRACTS AWARDED

Atlanta, Ga.—Sinking artesian wells, to Jos. Koehne, $4,800.

Eldora, Ia.—Furnishing 2,000 ft. 4-in. c.-i. water pipe to U. S. Cast-Iron Pipe & Foundry Co., $28.35; other bidders: J. B. Clow & Sons, Chicago, $31; Illinois Malleable Iron Co., Chicago, $29.45; Sheffield Cast-Iron Pipe & Foundry Co., Minneapolis, Minn., $28.84; American Cast-Iron Pipe & Foundry Co., Kansas City, Mo., $28.75.—L. J. Stout, City Clerk.

Ft. Riley, Kan.—Extension of water main, to F. F. Ziegler, Junction City, $6,196.

Grand Rapids, Mich.—Furnishing hydrants for year to R. D. Wood & Co.

Brooklyn, N. Y.—The Cranford Co., furnish and lay high-pressure fire mains in Gowanus and South Brooklyn districts; detailed bids given in June 1 issue, where low bidder who has since been awarded contract was erroneously printed "Sanford Co."

Niagara Falls, N. Y.—Raising dam at Washington Lake, to P. P. O'Hehir, Warwick, $46,153; furnishing 30 tons of 6-in. c.-i. pipe and for special castings for main in Prospect st., to United States Cast Iron Pipe and Foundry Co., pipe, $24.65, $739.50, special castings, per lb., 2⅛c.; other bidders, Charles Millar, Sons & Co., $2,480, $744, special castings 2½c.; Warren Foundry and Machine Co., $26.25, $787.50, special castings, 2½c.; John Fox & Co., pipe $26.40, $792, special castings, 2½c.

Walters, Okla.—Water and sewer extensions, to C. A. Reese, Tahlequah, $66,356.50.

Eugene, Ore.—Building filtration plant to California Jewell Filter Co., $26.000.

Lakeview, Ore.—Constructing Drews Valley reservoir dam for Oregon Land Co., to E. S. Burney, $125,000.

Midvale, Utah.—Installation of water mains, to West Jordan Lumber Co.

Parkersburg, Va.—Water system, to Lloyd E. Smith, Charleston.

Burnaby, B. C., Can.—Constructing water works, to Brouse-Mitchell Co., Vancouver. —C. Saunders, City Clerk.

Montreal, Que., Can.—Supply of c.-i. pipe, 4,000 tons, to Beverley Robinson, representing Stanton Iron Works Co., Ltd., Nottingham, England, 4-in. pipe $29.50, 12 in., $27.50; Robert McLaren & Co., Glasgow, represented by L. H. Gaudry & Company, Quebec and Montreal, 6-in. $29, 8-in. $27.90, 10-in. $27.70, 16-in. $27.35, 20-in. $27; Canada Iron Corporation Co., Three Rivers, Que., 24-in. pipe $27, 30-in. pipe $27.50.

North Vancouver, B. C., Can.—Laying water mains throughout D. L. 553 to J. O'Connor, $705.

Ottawa, Ont., Can.—Supplying 10 joints for water pipes to Gordon Law, $1,650.

Richmond, B. C., Can.—Supplies for water works to the Pacific Coast Pipe Co., $69,931.86, for wood pipe; to Evans, Coleman & Evans, $16,216.12, for steel pipes; to Forsyth & Co., a sum of $480 for c.-i. pipes; to Forsyth & Co., $765 for valves; to Terminal City Iron Works, $760 for special castings.

BIDS RECEIVED

Waterbury, Conn.—Building Morris dam, for city water supply, Ryan-Unmack Co., New Haven, lowest bidders, $525,000.

Danville, Ill.—Reconstruction of concrete dam for Danville Water Co.: (a) Concrete per cu. yd. including cofferdam and removal of sections of present dam, (b) earth excavation per cu. yd., (c) shale excavation per cu. yd., (d) extra steel reinforcement, price per lb.: Western Concrete Bridge Co., First National Bank Building, Chicago (awarded contract), (a) $11.90, (b) $1, (c) $2.50, (d) 3c.; L. E. Granke, Chicago, (a) $17.10, (b) $1, (c) $1.50 and $3.50, (d) 4c.; Fa'kenan Electrical Construction Co., Chicago, (a) $18.40 ($3.60 per cu. yd. for removing sections of present dam), (b) 70c., (c) $1.30, (d) 5c.

Portland, Ore.—Furnishing steel pipe for proposed submerged pipe line across Willamette River, bidders, Crane Co., $30,800; R. A. Hoge, $31,350.

Ft. Meade, S. D.—Constructing concrete dam and clearing reservoir site, in connection with water system; following is detail bid of Bartlett & Kling, Cedar Rapids, Ia.: Earth excav., 36c. per cu. yd.; rock excav., $1.80 cu. yd.; rip rap, $1.40 cu. yd.; 16-in. c.-i. pipe without valves, $5.84 per lin. ft.; 12-in. c.-i. pipe, $4.67 per lin. ft.; 4-in. vitr. drain pipe, per lin. ft., 50c.; concrete, $7.35 per cu. yd.; valves and fittings, lump sum, $875.

LIGHTING AND POWER

Camden, Ark.—Camden Power Co. has been incorporated by T. J. Watts, G. R. Belky, and others, of Camden, to manufacture electrical power and to establish plants for distribution; capital $100,000.

Dardanelle, Ark.—C. S. Bacon, 900 Main st., Pine Bluff, has secured 50-year franchise to furnish electricity; has purchased town plant.

Los Angeles, Cal.—Property owners of 4th st., between Main and Central, are urging installation of ornamental street lights.

Whittier, Cal.—Board of Trustees will employ engineer to make report of cost of erecting plant to supply electricity and gas.

Jewett City, Conn.—Nashawaug Electric Power Co. has been granted 10-year franchise to supply electric lights.

Dunnellon, Fla.—City will rebuild power plant, furnishing power for both electric light and water plants.

Milton, Fla.—City will soon have plans

Newton, Mass.—Bids received May 25 by the Metropolitan Water and Sewerage Board, Boston, Dexter Brackett, Chief Engineer, for laying 8,830 ft. of 60-in. c.-i. water pipe in Newton: (A) James H. Fannon, Somerville; (B) Cavanagh Bros., Boston, awarded contract; (C) Bruno & Petitti, Boston; (D) Merrill-Ruckgaber Co., New York, N. Y.; (E) Coleman Bros., Boston; (F) Luke D. Mullen, Boston; (G) Joseph Hanreddy, Chicago, Ill.; (H) The Henry Spinach Contracting Co., Waterbury, Conn.; (I) John J. Falvey, Somerville.

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)
8,830 lin. ft., laying 60-in. c.-i. pipe	$3.25	$3.82	$3.95	$3.92	$4.00	$4.25	$4.32	$4.58	$4.59
140 lin. ft., laying 12 and 16-in. c. i. pipe for blow-offs	1.00	1.25	1.00	.65	2.00	2.50	1.50	.80	2.00
100 cu. yds. rock excavation above grade	5.00	8.00	3.00	6.50	6.00	5.00	5.00	5.00	4.50
5 cu. yds. rock excavation below grade	5.00	8.00	3.00	7.00	8.00	5.50	6.00	10.00	5.00
50 cu. yds. earth excavation below grade	1.00	2.00	1.50	.75	1.50	1.00	1.50	5.00	1.50
6 chambers for air valves	50.00	50.00	35.00	35.00	100.00	60.00	50.00	50.00	25.00
5 chambers for blow-off and by-pass valves	50.00	60.00	45.00	60.00	100.00	60.00	90.00	50.00	60.00
2 chambers for 36-in. valves	100.00	60.00	75.00	75.00	50.00	80.00	100.00	45.00	100.00
70 cu. yds. concrete masonry	10.00	7.00	7.00	10.00	7.00	9.00	9.00	7.50	8.00
Totals	$30,862	$36,056	$36,484	$36,787	$38,005	$39,905	$40,541	$42,518	$42,570

Newburgh, N. Y.—Bids for doing work connected with raising of dam at Washington Lake.—Superintendent Stanton.

BIDDERS	Excavation	Embankment	Rock Excavation	Puddle Wall "A"	Puddle Wall "B"	Brok'n Stone	Rolling Patton Ave.	Old Slope Paving	New Slope Paving	Pointing Slope Pavi'g	Rip-Rap Walls	Concrete Masonry	Remov. & Rebl'g Waste Weir	Remov. & Repl'c. Calyer Gate House	Hauling & Laying 16-in. C. I. Pipe
W. J. Randall, Stillwater, N. Y.	$0.60	$0.50	$1.00	$1.60	.....	$2.00	$1.05	$0.60	$1.20	$0.20	$2.50	$7.00	$4.00	$150	$0.10
Hudson Terminal Construction Co.	.45	.55	1.50	2.00	$2.50	2.25	.15	.60	1.20	.20	2.00	7.50	3.38	375	1.00
Donado Couzzo	.68	.48	1.50	1.10	2.75	2.00	.15	.55	1.00	.25	2.00	7.00	3.00	250	1.00
P. O'Hehir of Warwick	.53	.49	1.50	1.00	1.50	1.85	.10	.70	.75	.30	2.35	6.75	2.00	300	1.00
Samuel Beskin of Melzinga	.50	.50	1.50	1.25	2.75	1.95	.10	.45	.90	.35	2.40	7.50	2.00	300	.75

drawn for proposed electric lighting plant; cost $10,000.—W. W. Clark, Mayor.

Grangeville, Ida.—Grangeville Light and Power Co. has been taken over by Big Bend Light and Power Co.; new management plan extensive improvements.

Logansport, Ind.—Merchants have decided to install electric light arches across streets at their own expense.

Winslow, Ind.—Installing electric light system, to Winslow Electric Light Co.

Wapello, Ia.—Ott Bros. Co., Chicago, Ill., are considering constructing of electric light plant.

Bowling Green, Ky.—T. W. Jenkins and J. W. Bearce organized company, $50,000 capital stock, to construct electric light and ice plants.

Elkton, Md.—Citizens will vote July 11 on $50,000 bonds for light and water plant.

Lowell, Mass.—Contract for lighting city will expire in September. Address Mayor Meehan.

Somerville, Mass.—Committee on Public Property is considering advisability of establishing in Latin school electricity generating plant to supply electricity for lighting different municipal buildings on Central Hill.

Buffalo, Minn.—Council is planning erection of power house.

Crookston, Minn.—Crookston Gas Co. will erect plant in near future; capital $100,000. —E. B. Southwick, Edw. Williams and M. Riegler, Cleveland, Incorporators.

Amory, Miss.—Citizens have decided to issue $18,000 bonds for purchase of electric light plant.—J. M. May, City Clerk.

Oxford, Miss.—Citizens have voted $30,000 bonds for extension of electric and water systems.

Greenfield, Mo.—Greenfield Electric Co. will install new generator and engine in fall.—John Haines, Chief Engineer.

Ocean City, N. J.—Committee from Hotel Proprietors' Association, J. W. Sims, Chairman, has suggested to Council that it would be a good plan to illuminate boardwalk each night with incandescent bulbs from June 15 to September 15.

Paulsboro, N. J.—Citizens have voted $7,000 bonds for extension of gas mains and street improvements.—Wm. Adamson, Mayor.

Brooklyn, N. Y.—Brooklyn Union Gas Co. will expend about $2,000,000 in improvements and extensions.—E. R. Chapman, Treasurer.

Buffalo, N. Y.—Plans are being revised for power plant in Erie County Penitentiary; cost $75,000.—Frank B. Steele, Clerk Board of Supervisors.

Lawton, Okla.—City is considering installation of "White Way" and will soon advertise for supplies and material.—W. R. Julian, City Clerk.

Henryetta, Okla.—Henryetta Electric Light and Ice Co. has been organized to construct electric light plant and ice factory.

Oklahoma City, Okla.—Oklahoma Railway Co. will install additional machinery, increasing capacity from 2,800 to 7,200 h. p. —Anton H. Classen, President.

Newmanstown, Pa.—Town will be lighted by electricity by Wernersville Electric Light Co., until people of former town can complete their own plant.

Philadelphia, Pa.—Bids will be received by the Commanding Officer, Frankford Arsenal, for furnishing 1,300 tungsten lamps, under proposal No. 263.

Philadelphia, Pa.—Suburban Gas Co. is planning extension to Doylestown.

West Chester, Pa.—Council is considering ordinance providing for a subway in which all the telephone, telegraph and electric light wires shall be placed and poles removed from streets.

Mobridge, S. D.—Council has granted franchise to L. E. Pierce for electric lighting plant; cost about $10,000.

Fort Worth, Tex.—Commissioner Powell will at early date introduce ordinance requiring all of electric wires to be installed underground; cost about $2,000,000 if made general for the whole city and fully $750,000 if made applicable only to fire districts.

Glen Rose, Tex.—D. E. McDonald, San Antonio, is considering construction of concrete dam across Paluxy River.

Texas City, Tex.—Texas City Transportation Co. will install additional unit.—L. L. Summers, Consulting Engineer.

Richmond, Va.—Clarence Cosby desires addresses of oxygen manufacturers who supply gas for commercial use.

Everett, Wash.—To properly serve Everett and Snohomish with illuminating and cooking gas, Northwest Light & Power Co. proposes within a short time to remodel source of supply along lines that will give a daily capacity of 1,000,000 ft.

Bowmanville, Ont., Can.—Citizens have voted to purchase plant of Bowmanville Electric Light Co.

Ingersoll, Ont., Can.—Citizens have voted $39,800 bonds to acquire plant of Ingersoll Electric Power and Light Co., and $15,000 bonds to make improvements.

Medicine Hat, Alta., Can.—M. A. Maxwell has reported favorably on installation of municipal electric light and power plant; cost, $50,000.

New Hamburg, Ont., Can.—Citizens have voted to purchase local electric light plant.

CONTRACTS AWARDED

Mobile, Ala.—Installation of lighting system for government, to Mobile Electrical Supply Co., 71 Dauphin st.; work includes wiring of buildings, furnishing and installing lighting fixtures and appliances, wattmeters, transformers and installing primary and secondary pole lines and street lights.

Atlanta, Ga.—Installing generator, to Allis-Chalmers Co., of Milwaukee, Wis., $3,755.

Sturgis, Mich.—Equipment for the proposed hydroelectric power plant to be erected on St. Joseph River, at Lelands, to Allis-Chalmers Co., Milwaukee, Wis.

Dayton, O.—Lighting streets and alleys with gas, to Dayton Gas Co., $21.85 per lamp per year.

Martins Ferry, O.—Two boilers, to Erie City Boiler Co., Erie, Pa.; engine, to Buckeye Engine Co., Salem, O.; 250 k.g. generator, to Silas Chalmers Co.

Harrisburg, Pa.—Lighting city offices and fire engine houses, renewal, to Harrisburg Light, Heat and Power Co. and Paxtang Electric Co.

Elizabethtown, Tenn.—Building 9,000 h.p. plant on Watauga River, to W. J. Oliver, Knoxville.

BIDS RECEIVED

Ft. McKinley, Me.—Constructing and remodeling electric lighting system: John R. Bowker, Boston, Mass., $4,962; Lord Electric Co., New York City, $4,698; Whitall Electric Co., Westerly, R. I., $8,890; A. D. Granger Co., New York, N. Y., $6,368; Cowden & DeYoung, Inc., New York City, $5,181.

Fort Andrews, Mass.—Construction of electric lighting system, (a) wiring certain buildings, repairing wiring in certain buildings, etc.; (b) construction primary, secondary and street light lines, etc.; (c) furnishing and delivering all wattmeters, transformers, etc.; (d) construction of brick building for substation: Lord Electric Co., New York, Item (a) $3,589, (b) $3,754, (c) $2,430, (d) $550; Alfred J. Hixon, Boston, Mass. (a) $4,143, (b) $5,925; Whitall Electric Co., Westerly, R. I., (a) $5,800, (b) $5,600, (c) $2,500, (d) $800; James Wilkinson & Co., Boston, Mass., (a) $3,135, (b) $4,509, (c) $2,431, (d) $1,425; Clark & Mills Electric Co., Boston, Mass., (a) $3,478, (b) $4,991, (c) $2,758, (d) $1,295; McCay Engineering Co., Baltimore, Md., (a) $4,054, (b) $8,950, (c) $2,685, (d) $990; Western Electric Co., Boston, Mass., (c) $1,259; General Electric Co., Boston, Mass., (c) $2,272; Westinghouse Electric & Mfg. Co., Baltimore, Md., (c) $2,380; John R. Bowker, (a) $3,685, (b) $4,848, (d) $1,441.

FIRE EQUIPMENT

Chester, Conn.—Citizens will vote on purchase of hose, ladder truck and six extinguishers.

New Haven, Conn.—Fire Chief R. R. Fancher is urging installation of fire alarm system.

Winterhaven, Fla.—Funds are being raised for purchase of apparatus.

Quincy, Ill.—City will purchase chemical hose cart.—G. L. Schlag, Chief.

Hammond, La.—City will purchase hose wagon.—D. W. Wolff, Chief.

Wilton, Me.—Purchase of fire apparatus is being considered. Dr. J. W. Perkins is interested.

Darlington, Md.—Fire company has been formed.—W. H. Whiteford, President.

Hillsdale, Md.—Fire company has been organized; engine house will be erected.

Grafton, Mass.—City will purchase chemical engine; $1,200 available.

New Bedford, Mass.—Bids will be asked for new boilers for No. 4 and No. 7 engines. Address Chief Dahill.

Worcester, Mass.—Fire Chief George S. Coleman has made following recommendations: Equipping all apparatus with rubber tires; purchase of combination chemical and hose wagon; an engine for Burncoat st. station; overhauling a steamer now in service; purchase of a new second-size steamer; purchase of 5,000 ft. of 2½-in. hose.

Bay City, Mich.—Fire Commissioners have asked for following appropriations: Apparatus repairs, $600; new hose, $2,000; two new fire bells, Nos. 5 and 9, $300; auto fire engine, fully equipped, $6,500.—T. K. Harding, Chief.

Alexandria, Minn.—Installation of electric fire alarm system is being considered.—L. S. Kent, Chief.

Minneapolis, Minn.—City is considering erection of fire stations.—J. R. Canterbury, Engineer; H. W. Knott, City Clerk.

Billings, Mont.—Citizens will vote June 20 on $20,000 bonds to erect house for truck company.

Belleville, N. J.—Town has voted following: 800 ft. of new hose, $850; repairs on 3 fire trucks, $250; 2 new fire alarm boxes, $200.

Westfield, N. J.—Bids will be received until June 20 for erection of fire house.

Brooklyn, N. Y.—Yearly budget includes appropriations for erection of three fire stations and installation of apparatus.

Dunkirk, N. Y.—Village Trustees of Cassadaga have decided to organize two hose companies for protection of the village; hand-pump has been procured and chemical wagon will be bought.

Hollis, L. I., N. Y.—Architect Walter B. Wills, 32 Ditmars st., Brooklyn, has completed plans for erection of $5,000 fire station for Hollis Hook and Ladder Co.

Newburgh, N. Y.—Fire Department Committee is considering plans for erection of three-story house for Chapman Steamer Co.

New York, N. Y.—Municipal Art Commission has approved plans for Firemen's memorial, cost $80,000, to be erected on Riverside Drive.

Ashtabula, O.—City is considering erection of two buildings and buying apparatus for fire department; cost $25,000.—G. E. Ducro, Fire Chief.

Dayton, O.—Safety Director Leinesch and Chief Ramby are conferring upon new ornamental design for posts of the fire alarm boxes, which will be installed in city within next few weeks.

Youngstown, O.—Council is considering purchase of site at Steel st. and Mahoning ave. for fire department purposes.

Chambersburg, Pa.—Citizens will vote on $5,000 bonds for proposed east end fire house.

Coatesville, Pa.—Council has decided to purchase for Brandywine Fire Co. a combination chemical and hose wagon; cost $3,500.

Kittanning, Pa.—Hose Co. No. 3 is considering purchase of auto apparatus.

Mt. Penn., Pa.—Town is considering $2,500 appropriation for additional fire station.

Schuylkill, Pa.—Erection of combined fire station and city hall is being considered.

Williamsport, Pa.—Council is considering ordinance calling for appropriation for 1,000 ft. of fire hose; Fire Committee is considering purchase of combination auto hose wagon and chemical engine; cost $5,000.

Trent, S. D.—City has decided to purchase two chemical fire engines, one 40 and one 60-gal.

Norfolk, Va.—Fire Chief McLaughlin will recommend purchase of breathing apparatus for fire equipment.

Fairmount, W. Va.—Fire Committee will secure estimates for erection of combined fire station and city hall on Monroe st.

CONTRACTS AWARDED

Los Angeles, Cal.—Fire house on Stephenson ave to Cook-Truitt Construction Co., $13,669.

Hartford, Conn.—Building drill tower for fire department, to Thos. Barrett Co., $2,000, unpainted.

Perth Amboy, N. J.—Erecting fire house to Soren C. Olsen, $8,133.

Steelton, Pa.—Fire house for Hygienic Hose Co., to H. C. Wright, $5,982; 1,000 ft. cotton hose, to Eureka Hose Co., $1.10 per ft. and 400 ft. rubber hose, to Voorhees Rubber Manufacturing Co., $1.10.

Midvale, Utah.—Furnishing fire hose to West Jordan Lumber Co.

BRIDGES

St. Augustine, Fla.—City has decided to construct bridge at South st.

Lewiston, Ida.—County Commissioners are considering reconstruction of bridges destroyed throughout Nez Perce County by high water.

Mendota, Ill.—Council has decided to have plans prepared for reconstruction of bridges on Jefferson and South sts.

Richmond, Ind.—County Commissioners will soon ask bids for erection of four bridges.

Washington, Ind.—County Commissioners of Daviess County have reconsidered action of a former session and agreed to join with Knox County in construction of bridge across the White River; cost $18,000.

Baltimore, Md.—Harbor Board and Board of Estimates have approved plans for bridge over Jones Falls at Pratt st., 120 ft. wide; cost $9,000.—W. J. Douglas, Engineer, 2811 Adams Mill road, N. W., Washington, D. C., Consulting Engineer.

Haverhill, Mass.—Council has passed ordinances for building two small bridges; also culvert on Hilldale ave.

New Ulm, Minn.—Board of County Com-

missioners is considering building bridges in following townships: Eden, five bridges; Bashaw, two bridges; Sigel, one bridge.

Springfield, Mo.—City Engineer Harry C. Horton will prepare estimates for construction of concrete structure over Jordan on Boonville st.

Nashua, N. H.—Building reinforced concrete bridge over Merrimack River, to the Fred T. Ley Co., Springfield, Mass.

Gloucester City, N. J.—Camden County Board of Freeholders is considering erection of bridge over Newton Creek at Broadway.

Dayton, O.—Montgomery County will spend $15,000 this fall in repairing bridges.

Youngstown, O.—Erection of bridge from end of Summit ave. to Oakland and Hine sts. is being considered.

Altoona, Pa.—Council is considering ordinance calling election on $260,000 bonds to erect bridge at 7th st. and for street and sewer improvements.

Kittanning, Pa.—Construction of bridge over Cherry Run Road is being considered by Court of Armstrong County.

Philadelphia, Pa.—West End Business Men's Association is urging erection of bridge in Lower Oxford Township.

Westchester, Pa.—County Surveyor N. A. Rambo is preparing plans for erection of two county bridges.

York, Pa.—Cumberland County Commissioners are considering construction of joint bridge across Yellow Breeches Creek.

CONTRACTS AWARDED

Bridgeport, Conn.—Constructing bridge over Rooster River, at Brooklawn ave., to Tool & Sunderlin, $5,518.

Independence, Kan.—Number of arch concrete bridges for county to Weber Bros., Springfield, Mo.

Ypsilanti, Mich.—Bridge to George W. Miller, of the Advance Construction Co., $23,000.

Plainfield, N. J.—Bridge on Valley road, Scotch Plains, to Chas. Peterson, city, $1,485.

Fargo, N. D.—Bridge construction and repair work, ten contracts, to Jardine & Anderson, city; seven culverts, to Hennepin Bridge Co., Minneapolis.

Oakport, N. D.—Reinforced concrete bridge, to J. V. Godfrey, Fargo.

Niles, O.—Substructure of Park ave. bridge to L. H. Young Co., $5,700.

Tacoma, Wash.—Reinforced concrete bridge over Buckley Gulch, to Putnam & Healy, $49,780.

St. Mary's, W. Va.—Constructing wagon bridge over Middle Island Creek at Arvilla, to York Bridge Co., York, Pa., $4,400; stone work, to W. G. & J. B. Wilson, about $4,000.

BIDS RECEIVED

Ottawa, Ill.—Bids for concrete approach to the Illinois river bridge have been received as follows: I. L. Woodward, 1775 yds. concrete at $5.89; Fahr Con. Co., Chicago, concrete $5.30, balustrade $1.30 per ft., sidewalk 10c., filling 30c.; C. A. Weaver & Sons, Clayton, Ill., concrete, $6.10; H. H. Ohme, concrete $5.40, balustrade $1.25, sidewalk 15c., filling 50 c.; John Devere, Kankakee, concrete $4.90, balustrade 95c., sidewalk 16c.; A. M. Blodgett Con. Co., Kansas City, concrete $5.80; Alex McLean and H. Scherer, filling, 38c.

Duluth, Minn.—Building three concrete bridges, McAdams & Preston, lowest bidders.

MISCELLANEOUS

Mobile, Ala.—Council has accepted plans by Downey & Denham for remodeling city hall; cost $30,000.

Texarkana, Ark.—Installation of municipal abattoir is being urged by Dr. F. L. Peck.

Oakland, Cal.—Bids will soon be asked by City Engineer for construction of the Livingston st. wharf; cost about $175,000.

Winsted, Conn.—Allen & Williams, New Haven, have prepared plans for proposed $65,000 town hall.

Wilmington, Del.—Bids will be asked by Public Building Committee for improving police station.

Atlanta, Ga.—City will expend $12,500 for improvements to stockade.—R. M. Clayton, City Engineer.

Muncie, Ind.—Need of city hospital is being urged by Dr. R. H. Bunch.

Maysville, Ky.—Mason County will vote on $60,000 bonds to build county infirmary; erection of court house is being considered.

Baltimore, Md.—Architectural Commission is having plans prepared by Archer & Allen, Central Savings Bank Bldg., Baltimore, for public baths and comfort station at Greenmount and Harford aves.; cost $30,000.—Edward D. Preston, Inspector of Buildings.

Lansdowne, Md.—Town is considering erection of town hall.

Lawrence, Mass.—Plans have been drawn by Architect Ashton for remodeling city hall.

Malden, Mass.—Board of Aldermen has ordered $1,000 appropriation for equipment of two public parks with gymnastic apparatus.

Swampscott, Mass.—Town will vote June 15 on appropriations for various improvements.

Breckenridge, Minn.—Architects Kinney & Jogerst, Minneapolis, have prepared plans for erection of jail.

Virginia, Minn.—Board of Health has been instructed to select site for establishment of incinerator plant at cost of $12,000.

Meridian, Miss.—City will issue $75,000 bonds to erect city hall.

Springfield, Mo.—Mayor R. E. Lee has recommended issuance of $100,000 bonds for erection of city hall and $75,000 of bonds for two sub fire stations.

Jersey City, N. J.—City Hall Commission has adopted resolution providing for thorough inspection of municipal building by architect who is to plan for necessary repairs.

Linden, N. J.—Township Committee is considering plans for $15,000 town hall.

New York, N. Y.—Municipal Art Commission has approved plans for erection of comfort station, cost $23,000, in Central Park; also preliminary plans for police station in Poplar st., Brooklyn; cost $100,000.

Schenectady, N. Y.—Board of Supervisors has decided to erect jail.

Troy, N. Y.—Plans have been submitted to Board of Contract and Supply to prevent repetition of the annual overflow of Oakwood ave. reservoir; plans provide for spillway at reservoir and for 8-ft. sewer at the foot of Eddy's Lane; 4-ft. sewer is to be laid from Winne's Brook; bids will be asked soon.

Utica, N. Y.—City has been granted permission to erect tuberculosis hospital.

Columbus, O.—Council is considering ordinance for issuance of $15,000 bonds for erection of comfort station in Goodale Park.

Philadelphia, Pa.—Fairmount Park Commissioners have asked $30,000 appropriation for repairs to Horticultural Hall.

Williamsport, Pa.—Council is considering ordinance appropriating $1,500 for repairs to city hall.

Fort Davis, Tex.—County Commissioners have adopted plans for erection of $40,000 court house and $6,000 jail.—Thurman & Co., Dallas, Architects.

McKinney, Tex.—Flanders & Flanders, Los Flanders Bldg., Dallas, are preparing plans for proposed city hall building. S. T. Hammond is interested.

Port Arthur, Tex.—Pleasure Pier Committee will advertise for bids to construct bridge causeway to connect wtih island in the lake which it is proposed to turn into amusement resort.

Edmonds, Wash.—Plans by Ward & Robinson, Architects, Seattle, have been adopted by Library Board for $7,500 building.

Charleston, W. Va.—City will soon install complete system of police patrol boxes.—Al. Guill, Chief of Police.

Fairmount, W. Va.—Fire Committee will secure estimates for erection of combined city hall and fire station on Monroe st.

Kenosha, Wis.—Architect Joseph Lindl has prepared plans for erection of jail.

Superior, Wis.—Board of Health has decided to recommend to Council purchase of a crematory for burning of refuse and rubbish collected by scavengers.

CONTRACTS AWARDED

Los Angeles, Ca.—Historical and Art Museum, general contract to J. F. Atkinson, $219,777; plumbing to Eugene Murray, $3,088, and electrical work to Richards-Neustadt Co., $3,126.

Washington, D. C.—Building two concrete pols for bathing beach, to R. J. Beall Construction Co., $2,370.

Jacksonville, Fla.—Automobile sprinklers to W. F. Alley, $3,829.

New Orleans, La.—Fabrication and erection of structural steel and cast iron for any or all of several sheds to McClintic-Marshall Construction Co., Pittsburg, Pa., for four of the sheds, as follows: Branch M. King Shed, $33,697; eighth Harmony Shed No. 2, $28,820; 3d st. Shed, $30,791, and Soraparu st. shed, $33,726; to Noelke-Richards Iron Works, Indianapolis, Ind., for 6th st. Shed, $13,091.—A. C. Bell, Engineer, 606 Hibernia Bank & Trust Co. Bldg.

New Orleans, La.—Work in 5th La. Levee District, as follows: To T. S. Shields, $17.35 per cu. yd. for Wilson Point levee; to Hercules Co., Ltd., $23 per cu. yd., for Elton levee, and $22.30 for Wyly levee; to Hilgason Bros., $17.90 per cu. yd. for Wilton levee.

Carthage, Mo.—Sprinkling Central ave., to Samuel Keller.

Wentworth, N. C.—Constructing jail, to Camden Iron Works, Salem, Va., $20,000.

Northwood, N. D.—Erecting city hall to Edw. Colton, Hatton, $7,531.

Park City, Utah.—Sprinkling streets to Walter Evans, $5 per day.

Watertown, Wis.—Constructing park in Sixth Ward; work consists of grading and sloping about 4,000 cu. yds. surfacing, planting trees, constructing a gravel walk, dredging canal, about 4,400 cu. yds.; erecting a bridge, span 26 ft., 8 ft. wide, etc., to J. L. Troding, Oconomowoc, $3,350.—Arnold Kraeft, City Engineer.

Vancouver, B. C., Can.—Building incinerating plant to Public Works Engineering Co., Portland, Ore., $70,000.

TOO LATE FOR CLASSIFICATION

STREET IMPROVEMENTS

Los Angeles, Cal.—Bids for the Los Angeles-Inglewood-Herworth Beach boulevard have been rejected because they exceeded the engineer's estimate.

Oakland, Cal.—Eighth street from Clay to Southern Pacific mole will be paved with asphalt.

Redding, Cal.—Bids for constructing the last 14 miles of the Kennett-Antler wagon road will soon be advertised.

Chicago, Ill.—Bids will be received June 27, 8 p. m., for $270,000 bonds for grading, paving, etc., in Paving District No. 1.—Jas J. Withrow, City Clerk.

Princeton, Ind.—County Commissioners have acted favorably on petitions for 16½ miles of road improvements.

Creston, Ia.—Bids will be asked on 25,000 yards of brick paving on concrete base and 17,000 ft. curb; all bids have been rejected for 50,000 yards bituminized macadam and 17,000 ft. of curb.—F. S. DeLay, Engineer in Charge.

Kansas City, Kan.—Trustees of Kansas City University have decided to ask Park Board to construct boulevard along 33d st., on east side of campus.

Elizabeth, N. J.—The Long Branch railroad has offered to remove all grade crossings if city will pay half.

Bronxville, N. Y.—Citizens have voted $60,000 bonds for improvements, including paving of streets.

Buffalo, N. Y.—The Aldermanic Street Committee has decided to repave a portion of Broadway, now paved with asphalt, with Medina block.

Medina, O.—County has sold $2,500 road bonds to F. D. Alyard, city.

Reading, Pa.—Bids will be asked for an asphalt plant; $3,500 has been appropriated.

Wilkes-Barre, Pa.—An ordinance has been passed for paving and curbing Thomas street.

Woonsocket, R. I.—Council will consider $25,825 appropriation for paving S. Main st. with granite blocks.

Memphis, Tenn.—City will soon ask for bids for improving following streets: Floyd alley, cost $533.30; North court, $2,925.78; McCall place, $531.90; Center alley, Union to Monroe, $1,591.65; Monroe ave., $5,308.82; Gayoso ave., $3,615.41; Center alley, Gayoso to McCall place, $1,252.35; South Court ave., $2,399.40; Court ave., $13,330.30; 2d st., $9,002.40, and Union ave., $2,804.18; ten streets will be improved in near future.

Bristol, Va.—Work of building four new macadamized roads out of city, into Washington County, by Goodson district and the city jointly, will be begun this year; district is now asking for its share of the county's $200,000 road bond issue, while it will raise $18,000 by special road levy.

CONTRACTS AWARDED

Little Rock, Ark.—M. D. L. Cook, 16,000 yds. asphalt paving 1½-in. thick on 5-in concrete foundation at $1.87; 6,000 cu. yds. earth excavation, 45c.; 5,000 lin. ft. concrete curb, 35c.

Bridgeport, Conn.—Lilliman & Godfrey, Stratford ave., wood block, $1.83 a sq. yd.

Bluffton, Ind.—Isaac Jacobs, gravel road to Woodward Bros., of Ossian, $2,973 and George Pence gravel road, $4,914; Lewis Coebbum gravel road to Abe Hosher, Bluffton, $2,082; Chris Stogdill gravel road to M. Alexander & Crosbie, Bluffton, $3,607; Elias Tice gravel road to J. N. Neff, Bluffton, $5,177; Peter Weisbrodt stone road to

(*Continued on page 902*)

BIDS ASKED FOR

STATE	CITY	RECEIVED UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
STREET IMPROVEMENTS				
New York	Troy	June 17	Regulating, grading, curbing, paving, Donn street	Jas. M. Riley, Sec'y Bd. Cont. & Sup
Virginia	Leesburg	June 17	Bldg. 2 miles macadam road, Purcellville to Silcott Springs	County Clerk.
New York	Watertown	June 17	Paving with brick asphalt or bitu. macadam: cost, $20,000	E. W. Sayles, City Engineer.
Ohio	Cambridge	June 17 noon.	Grading and macadamizing 0.51 mile; cost, $4,704	Board of County Commissioners.
Ohio	Delaware	June 18, 2 p.m.	Building Berkshire North Road	W. F. Whittier, Co. Surveyor.
New York	Buffalo	June 18, 11 a.m.	Paving var. sts. and furn. paving stone for street repairs	F. G. Ward, Comr. Pub. Wks.
Ohio	Cleveland	June 18, 11 a.m.	Grading and paving with brick 5,517 ft. of road in Chagrin Falls Twp.; cost, $1,000; also 3.4 miles, Parma Twp., $67,861	County Commissioners.
New York	Buffalo	June 18, 11 a.m.	Repair asphalt pavements for 18 months, paving, etc.	F. G. Ward, Com'r Pub. Wks.
Oklahoma	Ardmore	June 18, noon.	Building all sidewalks not laid on Fifth avenue	W. R. Burnitt, Street Com'r.
New Jersey	Jersey City	June 20, 2 p.m.	Imp. Mallory and Summit aves., wood block, cement walks	G. T. Bouton, Clk. St. and Wtr. Bd
Nebraska	Omaha	June 20, 2 p.m.	Grading Dodge and Chicago sts., and alley	G. W. Craig, City Engineer.
Alabama	Montgomery	June 20	Paving Lee st., asphalt or mineral rubber; curb, etc.	Robert Tait, City Treasurer.
Ohio	Cincinnati	June 20, noon.	Macadamizing, brick or comb. curb and gutter, etc., Wilson ave.	John J. Wenner, Clk. Bd. Pub. Serv.
Florida	Lake City	June 20, 5 p.m.	Vit. brick paving, 3,000 sq. yds; 2x6 all heart pine curb	Board of Public Works.
Ohio	Canton	June 20, 10 a.m.	Brick paving, grading, etc., 3.06 miles road	J. H. McConnell, County Auditor.
Indiana	Mishawaka	June 20, 6 p.m.	Paving 4,550 sq. yds. brick, asphalt, bitu. or creosoted wood	J. W. Haverly, City Engineer.
Iowa	Marshalltown	June 20, 8 p.m.	Paving, 45,600 sq. yds. cement pavements; 29,100 lin. ft. conc. curb and 12,700 sq. yds. brick block pavement	City Clerk.
Wisconsin	Madison	June 20, 2 p.m.	Paving University Ave. with asphalt	O. S. Norsman, City Clerk.
Iowa	Ft. Dodge	June 20, 5 p.m.	Paving, curbing and improving certain streets	W. L. Tang, City Clerk.
Illinois	Marshall	June 20	Brick paving, 11,800 sq. yds., cement filler; 5,210 ft. curb and gutter	Board of Local Improvements.
Ohio	New Lexington	June 20, noon.	Paving, grading, etc., Mill st	H. J. Stalter, Village Clerk.
New Mexico	Farmington	June 20, noon.	Bldg. about 30,000 sq. ft. cement walks, about 4,000 sq. ft. cement street crossings and 3,500 running ft. cement curbing on Main st	O. S. Stevens, Sec'y Board Improv.
Wyoming	Thermopolis	June 20, 10 a.m.	Bldg. 25,000 sq. ft. cement walks and 1,500 ft. cement curb	A. D. Cook, Cheyenne, Sec'y State Board of Charities and Reform.
Oklahoma	Nowata	June 20, 2 p.m.	Bldg. 38,442 sq. yds. brick paving, 11,994 lin. ft. combined curb and gutter	R. R. Sutton, City Engineer.
Washington	Colville	June 21, 2 p.m.	Clearing, grubbing, grading and draining State road No. 2	H. L. Bowlby, Olympia, Secretary State Highway Board.
Illinois	Danville	June 21	Bituminous paving on Pine st.; cost, $6,000	W. E. Wynn, City Engineer.
Illinois	Glencoe	June 21, 8 p.m.	Bldg. cement sidewalks	G. D. Hall, Village Secretary.
New Jersey	Newark	June 21, 4:15 p.m.	Artificial stone paving and curbing	R. D. Argue, Secretary Bd. Educati'n
Missouri	St. Louis	June 21	Curb, grade, lay Southern long-leaf yellow pine blocks, treated with creosote oil, on Rauschenbach ave.; $25,000	W. B. Dryden, Sec'y Bd. Pub. Imp.
New Jersey	Camden	June 21, 8 p.m.	Furn. material and doing work during year; also repairing and bldg. cement and brick sidewalks	E. Francis, Chm. Com. on Streets.
Washington	Olympia	June 21, 2 p.m.	Improving State Road No. 2, Stevens County	Henry L. Bowlby, Sec'y St. Hwy Bd.
Montana	**Billings**	**June 21, 8 p.m.**	**Creosoted block paving**, 59,856 sq. yds., Dist. No. 53	J. D. Matheson, City Clerk.
Indiana	South Bend	June 21, 10 a.m.	Paving Diamond ave. from Laporte to Michigan ave	A. P. Perley, Clk. Bd. Pub. Wks.
Ohio	Lima	June 21, noon.	Improving roads in 9 townships	C. R. Phillips, Clk. Co. Turnpike Dirs.
Illinois	Ottawa	June 21, 2 p.m.	Vit. brick paving, 3 sts.; 1,696, 20,929 and 17,484 sq. yds.; grading, 900, 7,000 and 6,411 cu. yds.; concrete base and curb, stone curb, etc	J. F. Farrell, Pres. Bd. Loc. Imp.
Ohio	New Philadelphia	June 22, noon.	Grading and paving 1.85 miles, Mill Twp.; cost, $28,166.87.	J. C. Wonders, State Hwy. Com'r.
Ohio	Springfield	June 23, noon.	Grading and macadamizing 2.50 miles of road, Springfield Twp.; cost, $12,021.40; check, $300	J. C. Wonders, State Hwy. Com'r.
Ohio	Carrollton	June 23, noon.	Paving several streets: 6,415 cu. yd. of extra excav.; 18,904 sq. yds. vit. block paving; 14,504 ft. of straight and 1220 ft. cir-1220 ft. circular curb, etc	A. K. Rader, City Clerk.
Indiana	Crawfordsville	June 23	Bldg. cement sidewalks	F. B. Robinson, City Clerk.
Ohio	Akron	June 23, noon.	Grading, draining, etc., four streets	J. W. Gauthier, Dir. Pub. Service.
Indiana	Ft. Wayne	June 23, 7:30 p.m.	Paving Wildwood avenue	H. W. Becker, Clk. Bd. Pub. Wks.
Pennsylvania	Mt. Pleasant	June 24, 8 p.m.	Grading and curbing two streets, 6,633 sq. yds	M. A. King, Secretary.
Ohio	Toledo	June 24, 10 a.m.	Repairing 2 macadam roads	C. J. Sanzenbacher, County Auditor.
Nebraska	Havelock	June 24	Bldg. 50 cement crossings and 8,000 ft. cement sidewalks	A. W. Barnes, City Engineer.
Indiana	Valaparíso	June 24	Building cement sidewalks; cost, $5,000	G. Stinchfield, City Engineer.
Pennsylvania	Pittsburg	June 24, noon.	Improving 2 public roads, 1 1-2 and 2 1-4 miles long	R. J. Cunningham, County Cont'ler.
Ohio	Van Wert	June 25, noon.	Draining, curbing and paving Washington st	F. B. Barrick, Clk. Bd. Pub. Serv.
Ohio	Belmont	June 25, noon.	Grading, paving and curbing 1 1-4 miles of road	J. M. Gordon, Turnpike Comr.
Ohio	Niles	June 25, noon.	Building 3 miles of roads	H. A. Simon, Pres. Co. Road.
Utah	Logan City	June 25, 4 p.m.	Paving in Dist. No. 17, five feet wide	Wm. Worley, Chm. Com'r Sts. and Sidewalks.
Virginia	Ft. Monroe	June 27	Macadam roads, brick gutters, concrete walks, etc.	Capt. E. R. Tilton, Constr. Q. M.
Virginia	Roanoke	June 27, noon.	Building granolithic sidewalks, two jobs	W. L. Craft, City Clerk.
Washington	Port Townsend	June 28, 8 p.m.	Brick pavement, 5,780 sq. yds.; concrete sidewalks, 10,740 sq. ft. curb and gutters, 9,052 lin. ft.; concrete for retaining walls, 3,800 cu. yds	Geo. Anderson, City Clerk.
Pennsylvania	Pottsville	June 28, 7:30 p.m.	Grading, curbing, and paving two sts.; "See Proposals"	J. A. Berner, Second st., Sec'y Coun'l
Ohio	Columbus	June 29, noon.	Imp. limestone and draining 13,796 lin. ft. Westerville road, Linden, also Jackson Pike	Hugh K. Lindsay, County Engr.
Iowa	Marshalltown	June 29	Paving 4 miles of road, 2-3 of concrete, remainder brick block.	Wm. Steiner, City Engineer.
Indiana	Anderson	June 30, 10 a.m.	Bldg. gravel road in line bet. Delaware and Madison counties.	W. T. Richards, County Auditor.
Indiana	Greenfield	June 30, 10 a.m.	Bldg. 18,480 ft. gravel road bet. Madison and Hancock Counties.	Chas. H. Troy, County Auditor.
Indiana	Brazil	June 30, 7:30 p.m.	Building cement sidewalks on National ave	Jacob Prevett, City Clerk.
Ohio	Gallipolis	July 1	Grading and draining 14 miles of pike road	M. F. Leonard, County Surveyor.
Indiana	Newcastle	July 5, 7 p.m.	Grading, paving and curbing portions of 3 streets	L. M. Johnson, City Clerk.
Indiana	Vincennes	July 5, 2 p.m.	Bldg. 5,736 ft., also 6,400 ft. gravel road	John T. Scott, County Auditor.
Indiana	Greencastle	July 5, 2 p.m.	Bldg. gravel road, 11,733 ft. long; 3 macadam roads, 11,252; 7,324 and 1,121 ft. long	D. V. Moffett, County Auditor.
Ohio	Canton	July 6, 10 a.m.	Brick paving, grading, draining 1 mile road, Lexington twp	J. H. McConnell, County Auditor.
Indiana	Evansville	July 7, 10 a.m.	Furnishing road roller	Harry Stinson, County Auditor.
California	Quincy	July 8	Bldg. road	County Clerk.
New York	Ft. Slocum	July 12, 11 a.m.	Building roads, walks, curbs, gutters and drains	Constructing Q. M.
Indiana	Evansville	July 18 10 a.m.	Improving and resurfacing Fourth and Division Streets	Harry Stinson, County Auditor.
SEWERAGE				
Utah	Salt Lake City	June 17	Bldg. pipe sewers in Sewer Extensions 246 and 251	H. G. McMillan, Chm. Bd. Pub. Wks
Iowa	Spencer	June 17, 8 p.m.	Bldg. sewer	R. L. Taylor, City Clerk.
Indiana	Hammond	June 20, 10 a.m.	Bldg. 18-in. vit. pipe sewer in Walter ave	A. L. Ebert, Pres. Bd. Pub. Wks.
Oklahoma	Nowata	June 20, 2 p.m.	Bldg. 2,990 lin. ft. 10 to 24-in. storm sewers, manholes, etc.	R. R. Sutton, City Engineer.
Nebraska	Crete	June 20, 2 p.m.	Installing sewer system: 40,206 lin. ft. 8" to 30" pipe sewer: cost $40,000. P. A. Edquist, Omaha, Engineer	F. A. Novak, City Clerk.
Iowa	Cresco	June 20, 8 p.m.	Building 6,350 ft. 8 to 12-in. sewers	P. J. McCullow, City Clerk.
Minnesota	Montevideo	June 20, 8 p.m.	Building sewer on Sixth street	J. M. Severns, City Clerk.
California	San Jose	June 20, 11 a.m.	Install sewage disposal system at County Hospital	H. A. Pfister, Clerk Bd. of Super.
Massachusetts	Brookline	June 20, 4:15 p.m.	Bldg. 550 ft. 60 x 60 in. concrete drain; 500 ft. 48 x 60 in.; 900 20 x 25 ft. concrete sewers; 2,000 ft. 8-12 in. sewer and drain, 2 streets	E. A. McEttrick, Secretary Town.
New Jersey	Jersey City	June 20, 2 p.m.	Building 575 ft. 15-in. vit. pipe sewer, 300 cu. yds. rock excav.	G. T. Bouton, Clk. St. and Wtr. Bd
Michigan	Hancock	June 20	Sewer extensions; C. B. M. Craig, City Engineer	W. Frank James, Mayor.
Dist. of Col'bia	Washington	June 20, 2 p.m.	Constructing sewers in District	Wm. V. Judson, Engr. Comr.
Indiana	South Bend	June 21, 10 a.m.	Bldg. pipe sewers in E. Wayne st. and Diamond ave	A. P. Perley, Clk. Bd. Pub. Wks.
New Jersey	Camden	June 21, 8 p.m.	Furn. material and building sewers during year; also cleaning sewers	E. Francis, Chm. Street Com.
Illinois	Glencoe	June 21, 8 p.m.	Bldg. sanitary sewers	G. D. Hall, Sec'y Bd. Loc. Improv.
Missouri	St. Louis	June 21	Bldg. River des Peres foul water sewer 2d section	W. B. Dryden, Sec'y Bd. Pub. Imp.
Ohio	Elyria	June 21	Building sewers in 3 streets and one avenue	L. B. Johnston, Clk. Bd. Pub. Serv.

BIDS ASKED FOR

STATE	CITY	RECEIVED UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
SEWERAGE (Continued)				
New Jersey	Hoboken	June 22, 4 p.m.	Rebuilding 1st street sewer as new concrete sewer, etc.	J. H. Londrigan, City Clerk.
New Jersey	Freehold	June 22, 11 a.m.	Bldg. 18,000 ft. 8-in. sewers, 3,400 ft. 4-in. iron force mains, 3 pumping stations, flush-tanks, manholes, etc.; Waring, Chapman & Farquhar, 874 Broadway, N. Y. City, Engineers.	Chas. H. Butcher, Town Clerk.
Ohio	Lebanon	June 24 noon	Bldg. 6,900 ft. 8 and 10-in. pipe sewers.	M. E. Guslin, Village Clerk.
Virginia	Roanoke	June 24, noon.	Building sewers in two streets.	W. L. Craft, City Engineers.
Indiana	South Bend	June 24, 10 a.m.	Bldg. overflow pipe sewer in East Wayne st.	A. P. Perley, Clk. Bd. Pub. Wks.
Oklahoma	Apache	June 27	Furn. material, etc., for sewer and water system, etc.	Town Clerk.
South Dakota	Vermilion	June 27, 8 p.m.	Building sewers in Pine and Yale streets.	C. I. Vaughn, City Auditor.
Indiana	Evansville	June 27	Building 770 ft. sewer in Governor street.	Board of Public Works.
Pennsylvania	Wescosville	June 27, 10 a.m.	Bldg. sewerage system; about 3,000 ft. 6, 8 and 10-in. vit. pipe, pump house, disposal plant, etc.; R. S. Rathbun, Engineer.	Board of County Commissioners.
Kansas	Burlington	June 28	Bldg. sanitary sewers, including disposal works.	Burns & McDonnell K. C., Engrs.
Tennessee	La Follette	June 29	Bldg. sewer and drain from Aspen st. to river.	J. Wm. Taylor, Chm. Bd. Pub. Wks.
Maine	Portland	July 1, noon.	Bldg. Sec. 2, Morrills Corner sewer.	Bion Bradbury, Jr., Com'r.
Pennsylvania	West View	July 1	Bldg. sewer system and disposal plant; Trimble & Moller, Engineers, 435 Fourth ave., Pittsburg.	H. L. Donaldson.
Ohio	Jefferson	July 1	Constructing sewers.	F. M. Miller, Village Clerk.
Oklahoma	Hugo	July 5	Bldg. complete sanitary sewer system; disp. plants, etc.	H. C. Blanchard, City Engineer.
Iowa	Pella	July 6, 8 p.m.	Bldg. 6 miles 8-15-in. pipe sewer; also disposal plant.	A. C. Kuyper, City Clerk.
Ohio	Struthers	July 6, noon.	Bldg. sanitary and storm sewers in Short and Elm streets.	L. S. Creek, Village Clerk.
Massachusetts	Boston	July 7 10 a.m.	Extension of sewer system at Fort Warren.	Capt. A. M. Miller, Q.M., U. S. Army.
Kansas	Sabetha	July 12	Bldg. sanitary sewers, including 2 separate disposal works.	Burns & McDonnell, K. C., Engrs.
WATER SUPPLY				
New York	Buffalo	June 17	Furn. c. i. pipe, specials, hydrants, valves, etc.	F. G. Ward, Comr. Pub. Works.
Indiana	South Bend	June 17, 10 a.m.	Building water connection in two streets.	O. C. Bastian, Chm. Bd. Pub. Wks.
Ontario	Coldwater	June 18, 6 p.m.	Furn. c.-i. supply main and distribution system; ground reservoir, collecting pipes and drains.	J. R. Russell, City Clerk.
Kentucky	Dayton	June 20, 8 p.m.	Franchise for bldg. and operating water system.	Will C. Martin, City Clerk.
New Jersey	Trenton	June 20, noon.	Bldg. 1,650 ft. 6-in. c.-i. water pipe, etc.	S. N. Kirkbride, Super. State Prison.
Ohio	Norwood	June 20, noon.	Furn. 150 5-8-in. water meters.	D. Armstrong, Clk. Bd. Pub. Serv.
Illinois	Glencoe	June 21, 8 p.m.	Bldg. water mains.	G. D. Hall, Sec'y Bd. Loc. Improv.
New York	Spencerport	June 21, 2 p.m.	Bldg. complete w. w. system: 25,000 lin. ft trenching and laying 4, 6, 8 and 10-in. pipe; furn. 500 tons c.-i. pipe, 20,000 tons specials; furn. and set 46 hydrants, 38 stop valves and boxes; furn. and erect. 100,000-gal. el. tank, 15x35 ft. pump-station, 20 h.p. duplicate pump-plant, open well, 75 cu. yds. concrete; Morrison & Farrington, Inc., Syracuse, Engrs.	Dr. Wm. R. Barrett, Village Pres.
Wyoming	Cheyenne	June 21	Bldg. reinforced-concrete lined reservoir, 5 miles from city; 2,800 cu. yds. concrete; 55 tons reinforcement; city to furnish cement, pipe and specials.	F. A. Bacon, City Clerk.
Georgia	Atlanta	June 21, noon.	Bldg. 8,000,000 gals. horizontal pressure filter plant.	W. Z. Smith, General Manager.
Ohio	Lorain	June 21	Furn. and lay 48-in. c. i., or 51-in. steel-riveted intake pipe from filter house, 2,800 ft. in Lake Erie; special valves and fittings; furn. and placing new intake cut, etc.	L. B. Johnston, Clk. Bd. Pub. Serv.
Ohio	Cincinnati	June 23, noon.	Furn. and deliver c. i. pipe and specials, etc., for distribution system in Spring Grove ave., also for laying same; two $1,000 checks.	John J. Wenner, Clk. Bd. Pub. Serv.
Kansas	Stafford	June 27, 8 p.m.	Building water works system.	J. R. Mullen, Mayor.
Pennsylvania	Wescosville	June 27, 10 a.m.	Bldg. rein. concrete stone pipe, 24x30 ft., conduit, intake, basins, etc.	Lehigh County Comrs., Allentown.
Oklahoma	Apache	June 27	Furn. mat. and mach. for water, elec. light and sewer plants.	Town Clerk.
New Jersey	Atlantic City	June 28, 2:30 p.m.	Erecting pumping station at Absecon.	L. Van Gilder, Superintendent.
Oklahoma	Cherokee	June 30, 3 p.m.	Extending water system; see Proposal adv., June 15th issue.	J. W. Rackley, City Clerk.
Kansas	Ft. Leavenworth	June 30, 10:30 a.m.	Furn. 85 tons soil pipe and fittings, 1,600 brass cocks, 795 non-syphoning basin traps and 10,000 ft. wrought iron pipe, etc.	Maj. T. H. Slavens, Con. Q. M.
Virginia	Louisa	July 2	Boring 10-in. artesian well for County and town.	J. J. Porter, Chm. Water Com.
Arkansas	Ft. Smith	July 6, 10 a.m.	Bldg. water main extensions; "see Proposals".	W. J. Johnson, Chm. Bd. Pub. Wks.
Utah	Salt Lake City	July 8, 10 a.m.	Sinking an artesian well on Levan ridge, Juab Co.	W. H. Farnsworth, Sec'y Land Bd.
Iowa	Corydon	July 11, 7:30 p.m.	Drilling deep wells; old bids rejected; $300 check.	Iowa Eng. Co., Clinton.
BRIDGES				
Connecticut	Bridgeport	June 17, 4 p.m.	Bldg. rein. concr. arch bridge; 2,500 cu. yds. of concr.	M. A. Kenny, Dir. Dept. Pub. Wks.
Ohio	Elyria	June 17, 1 p.m.	Building concrete culvert and doing bridge work, 2 jobs.	C. N. Lawrence, Co. Surveyor.
Georgia	Cedartown	June 20	Bldg. three concrete bridges.	J. L. Moore, Chm. Co. Commissioners
Oklahoma	Tulsa	June 21	Bldg. 28 bridges.	C. F. Rogers, County Clerk.
Missouri	St. Louis	June 21	Bldg. foundations and concrete work for viaduct, also approaches on Kings highway; deposit, $10,225.	M. Reber, Pres. Bd. Pub. Imp.
Ohio	Cleveland	June 22, 11 a.m.	Bldg. a culvert in River Rock township.	F. R. Lander, County Surveyor.
South Carolina	Spartansburg	June 22	Bldg. wooden bridge over North Tyger River.	D. M. Miles, County Supervisor.
Pennsylvania	Reading	June 23, 10 a.m.	Bldg. rein. concr. arch bridge.	A. L. Rhoads, County Controller.
Ohio	Cincinnati	June 24	Repairing bridges.	Fred. Dreihs, Clk. Bd. Co. Comrs.
Ohio	Cleveland	June 25, 11 a.m.	Bldg. 2 concrete bridges, one culvert and bridge extension.	F. R. Lander, County Surveyor.
Ohio	Warren	June 27	Building bridge over Yankee Run in Hubbard.	W. R. Carrington, Clerk Co. Comrs.
Pennsylvania	York	June 27, 10 a.m.	Building 40 ft. concr. bridge over Codorus Creek 114 ft. rdway.	W. H. Strine, Clk. Co. Comrs.
Ohio	Niles	June 27	Concrete and stone masonry for bridge on Park ave.	County Commissioners.
Missouri	St. Joseph	June 28	Bldg. 4 concrete culverts and repairing two bridges.	L. M. Stallard, Co. Hwy. Engineer.
Manitoba	Winnipeg	June 28, 11 a.m.	Constructing concrete piers, Brown and Brant St. bridge.	M. Peterson, Sec'y Bd. Control.
Indiana	Evansville	June 30, 10 a.m.	Building two rein. concrete bridges.	Harry Stinson, County Auditor.
South Dakota	Pierre	July 5	Building various bridges.	C. M. Price, County Auditor.
Washington	Stevenson	July 5, 1 p.m.	Bldg. bridge over Little White Salmon river, Sec. 15, Twp. 4.	Bd. of Comrs, Skamania County.
Texas	Arcadia	July 5	Bldg. from 50 to 100 wooden bridges.	R. W. Luttrell, Engr. Drain Dist.
California	Templeton	July 6, 10 a.m.	Bldg. steel concrete highway bridge.	H. L. Carpenter, Clk. Bd. Supr.
North Dakota	Fargo	July 6, noon.	Building 30-ft. bridge and repair 100-ft. bridge.	A. C. Lewes, Co. Auditor.
Virginia	Leesburg	July 25	Bldg. rein. concrete or iron bridge across "The Dutchman"; 55-ft. span, 12-ft. roadway, and abutments; also for bldg. bridge over Little River, near Aldie.	J. J. Crim, Chm. Co. Comrs.
Louisiana	Alexandria	July 28	Building creosoted timber frame protection fender on piles.	Ira W. Sylvester, Consulting Engr.
LIGHTING AND POWER				
Dist. of Col'bia	Washington	June 17, noon.	Lighting public sts., etc., with mantle naphtha lamps; one and three-year contracts.	C. H. Rudolph, Chm. Comrs.
Idaho	Idaho Falls	June 17, 3 p.m.	Bldg. hydroelectric plant and pumping station.	E. T. Coltman, Mayor.
New York	Fulton	June 17	Purchase of franchise for furnishing electricity.	Wm. MacNamara, City Clerk.
Ohio	Cincinnati	June 17, noon.	Bldg. retaining wall at west end of bridge, Elmwood.	Fred Dreihs, Clk. Co. Comrs.
Virginia	Boise City	June 20	Furn. electric motor and pump, 800 gals. per min., total head, 225 ft.; 60 cycle, 3 phase, 2,200 volt induction motor.	W. M. Page, City Treasurer.
Michigan	Stanton	June 22, noon.	Bldg. power house, plumbing, heating, wiring, etc.	W. Glen Abbott, County Clerk.
Oklahoma	Apache	June 27	Furn. material for electric light and water plant, etc.	Town Clerk.
Kansas	Stafford	June 27, 8 p.m.	Rebuilding electric light plant.	J. R. Mullen, Mayor.
Virginia	Luray	June 27	Lighting streets, 3 or 5 years; price on arc lights, 4 and 6 amp.; mean, 16 and 32 c. p.	B. F. Batman, City Recorder.
Ohio	Delaware	June 27	Lighting and heating system for Girls' Industrial School, inc. 30,000 ft. underground cable, 2 add. engines and generators, wire, etc.; cost, $70,000.	Bd. Trustees, Girls' Indus. School.
Ohio	Cleveland	June 29, 2 p.m.	Building power plant, installing equipment, building tunnel, steam pipe, condenser, etc.	County Building Commissioners.
Oklahoma	Cherokee	June 30, 3 p.m.	Extending electric light system; see Proposal adv., June 15 i sue	A. J. Titus, Mayor.
Florida	West Palm Beach	July 1	Constructing electric light plant, etc.	G. W. Jonas, Sec'y W. P. B. Imp. Co.

BIDS ASKED FOR

State	City	Received Until	Nature of Work	Address Inquiries to
MISCELLANEOUS				
Pennsylvania...	Philadelphia.....	June 17.....	Furn. dredge, tugboat and dump scows.....	Jos. Hasskarl, Act. Dir. Bd. Pub. Aff.
Ohio.....	Cincinnati.....	June 17, noon.....	Bldg. retaining wall at Elwood, Millcreek township.....	Fred Dreihs, County Clerk.
Massachusetts..	Boston.....	June 18, 11 a.m.....	Bldg. refuse kiln at navy yard.....	Commandant, Navy Yard.
Wisconsin.....	Oshkosh.....	June 18.....	Furn. 1,000 ft. 2½-in. fire hose.....	E. L. Ostertag, Comptroller.
Kentucky.....	Louisville.....	June 20, 10 a.m.....	Steel furniture and equipment for vaults of office building of Water Works Company.....	C. F. Grainger, Pres. Bd. Water Wks.
Minnesota.....	Montevideo.....	June 20, 8 p.m.....	Building 3-ward lock-up.....	J. M. Severens, City Clerk.
Illinois.....	Wheaton.....	June 20.....	Deepening and widening South Side drainage ditch 6,000 ft. below septic tank, 8 ft. wide at bottom, 1 ft. 1 in. slope.....	A. L. Webster, City Engineer.
New Jersey....	Westfield.....	June 20.....	Bldg. fire house.....	City Council.
Dist. of Col'bia.	Washington.....	June 20, 2 p.m.....	Purchase and disposal of street sweepings.....	C. H. Rudolph, Chm. Comrs.
Ohio.....	Cleveland.....	June 20, noon.....	Repairing and altering jetties at Gordon Park.....	A. B. Lea, Dir. Public Service.
Illinois.....	Chicago.....	June 22.....	Embankment and drainage of land near Summit.....	I. J. Bryan, Clk. Sanitary Dist.
West Virginia...	Wayne.....	June 22.....	Bldg. 40-mile telephone line, grounded system.....	Chas. Rigg, Mgr. Centerville Tel. Co. R. F. D.
Ohio.....	Cincinnati.....	June 22, noon.....	Erecting police station. Kennedy & Adkins, Architects.....	E. G. Prior, Sec'y Bd. Pub. Safety.
Missouri.....	St. Louis.....	June 24, noon.....	Furnishing 3,000 rein. interlocking concrete boxes.....	W. B. Dryden, Sec'y Bd. Improv.
Iowa.....	Council Bluffs...	June 27.....	Furn. aerial truck and 1,000 ft. 2½-in. hose.....	A. W. Casady, City Clerk.
Ohio.....	Columbus.....	June 30, noon.....	Furn. 25,000 or more sets of auto. number plates.....	C. A. Thompson, Sec'y of State.
Colorado.....	San Francisco...	June 30.....	Building sea wall: 43,000 tons rock, 95 tons structural steel and 6,000 cubic yards concrete.....	Harbor Commissioners.
Florida.....	West Palm Beach	July 1.....	Hydraulic dredging, 300,000 cu. yds.....	Geo. W. Jonas, Sec'y W.P.B. Imp. Co.
Dist. of Col'bia.	Washington.....	July 1, 2 p.m.....	Installing 75-ft. aerial extension ladder, raising mechanism on truck.....	C. H. Rudolph, Chm. Bd. Comrs.
Illinois.....	Rock Island.....	July 4.....	Installation of fire alarm system.....	M. T. Rudgren, City Clerk.
Mississippi.....	Natchez.....	Aug. 3.....	Sprinkling streets.....	W. G. Benbrook, Mayor.

Engle Bros., of Adams county, $4,971; Samuel Risley stone road, to Engle Bros., $5,435; and the J. E. Speheger road, stone, to L. O. Bears & Co., $4,489.

Johnson, Ind.—Edward Bobe, gravel road, $2,450.

Marion, Ind.—L. C. Lillard, boulevard, $32,254. O. J. Simmons, paving 38th st., $36,970.

South Bend, Ind.—C. H. Defrees, tar macadam road on Hammond court, $1.90 per lin. ft.; Hoban & Roach, brick pavement, $1.62 per foot; Harry N. Barnes, brick pavement, $1.63 per foot. Nelsonville block will be used.

Osage, Ia.—Detailed bids received May 31 for concrete pavements by S. B. Gardner, Engr. of Constr., Eldora, follow: (a) Dearborn & Jackson, Cedar Rapids, awarded contract; (b) Miracle Concrete Corporation, Des Moines; (c) O'Farrell Constr. Co., Dubuque; (d) B. J. Sweat, Boone: 28,585 sq. yd. concrete pavt., (a) $1.39, (b) $1.42, (c) $1.41, (d) $1.77; 8161 lin. ft. concrete curb, (a) 52c., (b) 54c., (c) 51c., (d) 45c.; 231 sq. yds. track pavt., (a) $2.10, (b) $2.10, (c), $2.15, (d) $3; 4-in. drain tile, per ft., (a) 15c., (b) 15c., (c) 20c., (d) 15c.; storm water design complete, (a) $1,200, (b) $1,300, (c) $1,250, (d) $1,250.

Garden City, Kan.—Wheeler & Kelleher, 15 miles road, Reno county, $9,000.

Leavenworth, Kan.—Geiser Mfg. Co., Waynesboro, Pa.; steam roller; $2,050.

Portland, Me.—Improvement of Eastern promenade, to Hassam Paving Co., Worcester, Mass., $11,241.25; other bidders: John W. Gulliver, $15,179.25; Forgione & Romano Co., $25,114.25.

Boston, Mass.—Mayor Fitzgerald has approved contract with J. Doherty for laying wood block pavement in Milk, Pearl and Oliver Sts., at $8,664; other bids: United States Wood Preserving Co., $9,112; J. B. O'Rourke & Co., $10,330.

Indianola, Miss.—Working remainder of the roads in county, to W. D. Parker, all roads in beat three, $70 per mile; to G. M. Turner, all the roads in beats three and four, $125 per mile; to Robert McLean, all roads west of river in beat four, $80; in beat five, to R. E. Connell, 85 miles, $85; to Dick Neely, 75 miles, $75; to E. H. Lombardy, six miles, $70, and to J. H. Blackwood, 15 miles, $80.

Albany, N. Y.—Repair Contract No. 76, Loudon, Sec. 2, county highway No. 119, Albany County, residuum, to T. F. Shaugnessy, Albany, $24,400; Repair Contract No. 78, Delmar-Slingerlands, county highway No. 92, Albany County, awarded on residuum to Alonz Schupp, Albany, $10,780; Repair Contract No. 65, Olean-Alleganey, county highway No. 601, Cattaraugus County, Bermudez, to F. V. Bardel, Buffalo, $6,500; Repair Contract No. 68, Greece-Smithville Flats, county highway No. 218, Chenango County, Albert Gaffey, Syracuse, $5,800; Repair Contract No. 62, Orchard Park, Sec. 5, county highway No. 272, Erie County, residuum, to John E. Hohnson, Buffalo, amount $6,913; Repair Contract No. 63, Transit, Sec. 2, county highway No. 89, Erie County, all bids rejected; Repair Contract No. 83, Gloversville-Mayfield, county highway No. 33, Fulton County, Bermudez, to John E. Burns & Co., Boston, $27,964; Repair Contract No. 57, Hamlin, Sec. 2, county highway No. 81, Monroe County, Bermudez, to Wood, Tompkins & Truesdale, Hilton, $22,890; Repair Contract No. 58, Scottsville, Sec. 2, county highway No. 79, Monroe County, residuum, to Niagara Con. Co., Corning, $20,613; Repair Contract No. 59, Clifton, Sec. 1, county highway No. 78, Monroe County, to Wood, Tompkins & Truesdale, Hilton, $4,390; Repair Contract No. 60, Scottsville, Sec. 1, county highway No. 63, Monroe County, to Whitmore, Rauber & Vincinius, Rochester, $11,945; Repair Contract No. 61, Ridg, Sec. 1, county highway No. 6, Monroe County, residuum, to Wood, Tompkins & Truesdale, Hilton, $7,785; Repair Contract No. 75, West Mohawk River, county highway No. 108, Montgomery County, residuum, to A. Schupp, Albany, $9,790; Repair Contract No. 85, Amsterdam-Minaville, Sec. 1, county highway No. 32, Montgomery County, Bermudez, to John E. Burns & Co., Boston, $10,673; Repair Contract No. 48, Deerfield, county highway No. 8, Oneida ,County Utica-Paris county highway No. 71 Bermudez, to Aetna Engr. Co., Herkimer, $41,400; Repair Contract No. 51, Gorham-Stanley county highway No. 203; Naples-Atlanta county highway No. 204; Naples-Woodville county highway No. 205, Ontario County, residuum, to C. Aikenhead Co., Rochester. $14,258; Repair Contract No. 86, Gilbertsville-Mt. Upton county highway No. 31, Otsego County, residuum, to W. J. Farrone, Oneonta, $25,847.97; Repair Contract No. 84, Troy-Brunswick, Sec. 1, county highway No. 10; Troy-Brunswick, Sec. 2, county highway No. 25, Rensselaer County, to County Construction Co., Troy, $15,381.32; Repair Contract No. 82, Waterford, Sec. 2, county highway No. 39, Saratoga County, to Kennedy & Easton Con. Co., Albany, $1,576; Repair Contract No. 72, Saugerties-Woodstock, Sec. 1, county highway No. 37; Saugerties-Woodstock, Sec. 2, county highway No. 38, Ulster County, residuum, to J. E. Consalus, Albany, $46,916; Repair Contract No. 73, Kingston-Rifton, county highway No. 116, Ulster County, residuum, to General Con. Co., Bridgeport, Conn., $13,400; Repair Contract No. 77, Loon Lake-Pottsville-Taylors, county highway No. 692, Warren County, Bermudez, Santonini Contracting Co., Albany, $31,505; Repair Contract No. 70, White Plains cross road, county highway No. 20; White Plains-Armonk, county highway No. 35; Armonk-Mt. Kisco, county highway No. 50, residuum, to H. B. Spraul, Peekskill. $55,809.

New York, N. Y.—Furnishing to Borough of Bronx: 50,000 gals tar road oil, Barrett Mfg. Co., 62c.; asphalt road oil, Standard Oil Co., 4.3c.; the Texas Co. bid 5½c.

Niagara Falls, N. Y.—Paving sections of 10th st. and Spruce ave., to H. P. Bugard, as follows: Spruce ave., pavement, asphalt, $15,785; hassam, $13,151; brick, $15,032.90; asphalt block, $17,542; bitulithic, $15,032.90. Tenth st. at subway, asphalt, $4,506.30; hassam, $3,783.50; brick, $5,048.40; bitulithic, $4,325.60; stone, $5,951.90. Tenth st. from subway to Erie ave., asphalt, $2,555.30; hassam. $2,158.50; brick, $2,555.30; block asphalt, $2,852.90; bitulithic, $2,456.10; stone, $3,384.90.

Utica, N. Y.—Building natural sandstone walks, to Alexander McMullin, Jay st., 52 ft. 5 ft. wide, 20c. per sq. ft.; South st., 181 ft., 5 ft. wide, 15c.; Martin st., 176 ft., 4 ft. wide, 14c.; Johnson square, 19 and 32 ft., 4 ft. wide, 14c.; Kellogg ave., 122 ft., 5 ft. wide, 15c.; Mathews ave., 40 ft., 5 ft. wide, 15c.; Ash st., 68 and 160 ft., 5 ft. wide, 15c.; constructing artificial sandstone sidewalks, to N. D. Peters, 15c. per sq. ft.

Cincinnati, O.—Granite paving on Elberon ave., to Ed. Ryan, $184,208.50.

Bartlesville, Okla.—Street paving, 16,000 sq. yds. vit. paving, concrete foundation, to Kansas Bitulithic Co., Kansas City, Mo., $2.38 per sq. yd., including draining and excavating; other bidders, Texas Bitulithic Co., $2.43; Granite Bitulithic Paving Co., $2.45; curbing, to same firm, 55c.—C. Pollock, City Clerk.

Muskogee, Okla.—Paving 9th st., to Contractor McCormack, $9,045.

McKeesport, Pa.—Opening and widening Walnut ave., to Bowman Bros. Co., $8,446; Romdine ave., to Robt. Weir, Jr., $6,035.90.

York, Pa.—The General Supply and Construction Co. to pave Court alley between North st. and Gay alley, with Mack blocks, for the A. B. Farquhar Co.

BIDS RECEIVED

Regina, Sask., Can.—Laying about 32,800 sq. yds. pavement on a concrete foundation; also 50,000 sq. ft. concrete sidewalks; (a) pavement per sq. yd; (b) curb and gutter per lin. ft.; (c) curb and gutter with base per lin. ft.; (1) sheet asphalt; (2) bitulithic; (3) creosote block pavement; (4) granitoid; (5) asphalt block: National Paving & Constr. Co., (a1) $3, (b) 60c., (c) 75c.; Bitulithic & Constr. Co., (a2) $3.05, (b) 80c., (c) 70c., (a3) $3.45, (b) 80c.; (c) 70c.; R. Blome & Co., (a4) $2.99, (c) 79c.; R. Bangham, (a5) $3.72 and $3.39, (c) 65c.; Kettle River Quarries Co., (a3) $3.60, (b) 75c.; Forest City Paving Co., (a3) $3.32 and $3.24, (b) 65c., (c) 55c. 50,000 sq. ft. concrete sidewalks, (a) per ft. for sidewalk; (b) per cu. yd., for 438 cu. yds. excav., in excess of 8 in.; (c) total: Forest City Paving Co., (a) 17 1-3c., (b) 70c., (c) $8,973; Western Pavers, Ltd., (a) 18c., (c) $9,000; City Engineer (a) 20c., (b) 45c., (c) $10,197. —L. A. Thornton, City Engineer.

SEWERAGE

Monroe City, Mich.—Plans are being prepared by Burns & McDonnell, Scarritt Bldg., Kansas City, Mo., for sewers and water works; cost $65,000.

Two Harbors, Minn.—Bids are being asked for construction of lateral sewer on 1st ave.

Winnemucca, Nev.—Louis C. Kelsey, Dooly Bldg., Salt Lake City, has been selected as Consulting Engineer for proposed sewerage system; $60,000 available.

Bronxville, N. Y.—Citizens have voted $60,000 bonds for improvements, including sewer system.

Dunkirk, N. Y.—City will lay sewers on Ocelot and three other streets.—John M. Hackett, City Engineer.

Yorkville, N. Y.—Village Board has decided to employ engineer to prepare plans and specifications for sewers.

Wilkes-Barre, Pa.—Ordinances for the construction of two lateral sewers have been referred to committee.

CONTRACTS AWARDED

Evansville, Ind.—Sewer in alley between Oakley st. and Fifth ave. from Franklin to Virginia sts. to Meguiar Const. Co.; for sewer in block 32, Lamasco, to John L. Newman.

Dunkirk, N. Y.—Building sewers, Railroad ave., to James P. Morrissey; Courtney st., to P. Goggin; Fox st., to E. J. Kuehn.

Seattle, Wash.—Grant Smith & Co., submitted two low bids for constructing Lake Washington section of north trunk sewer, $827,169 and $826,445; new bids will probably be invited.

WATER SUPPLY

East Sacramento, Cal.—The East Sacramento Water Company has been granted a franchise to supply water to the residents. Plans are being prepared for stand pipe to cost $15,000 to $20,000.

Georgetown, Cal.—Surveying parties are said to be locating a hydro-electric plant for the Loon Lake Water and Power Company at Pearine; reservoir is planned for Hotchkiss Hill.

San Francisco, Cal.—Acting City Engineer Connick has completed plans for pipe lines in the first district auxiliary system for fire protection.

Lemon, Col.—Burns & McDonnell, Engineers, 804 Scarritt Bldg., Kansas City, Mo., are preparing plans for water works and electric lighting; cost $45,000.

Canton, Kan.—Citizens have voted $30,000 bonds for water works and lighting plant.

Peabody, Mass.—$12,000 water bonds have been sold.

Monroe City, Mich.—Burns & McDonnell, 804 Scarritt Bldg., Kansas City, Mo., are preparing plans for water works and sewers; cost about $65,000.

Kearney, Neb.—Election to issue $125,000 bonds to purchase water works carried.

Niagara Falls, N. Y.—Taxpayers have decided not to extend intake for the new water supply system to the Canadian channel; estimated cost $116,000.

Fargo, N. D.—Citizens will vote July 6 on bonds for filtration plant and municipal lighting system.

Cincinnati, O.—Bids will be asked at once for laying 30-in. water main in Spring Grove ave.

Telford, Pa.—Committee of citizens will form Telford Water Co. to furnish water to this place and vicinity.

Everett, Wash.—Swalwell Investment Co. has applied to County Commissioners for franchise to lay water mains in the streets of Pinehurst additions.

Joseph, Ore.—City is preparing to build municipal water system; $20,000 bonds have been voted.

CONTRACTS AWARDED

Eugene, Ore.—Contract for filter signed up with Mr. Sisenwine, representative of the Jewell Filter Co., to put in system for $26,000; city will build the foundations and settling tanks; guarantee to deliver water to the mains 97 per cent pure.

Portland, Ore.—Laying water mains in Cleveland and Rodney aves., aggregating $5,224, to Williams & Beggs; Jahn Construction Co., for water mains in E. 12th and E. 17th sts., $8,896; bids of the Montague-O'Reilly Co. for laying mains in Glisan, 7th, 24th, Park, Newton and Wilson sts. have been rejected.

LIGHTING AND POWER

Auburn, Cal.—The Bell Electric Co. will spend $3,000 in improving the street lighting service.

Willows, Cal.—The Northern California Power Co. will construct a gas works in Willows.

Lemon, Col.—Burns & McDonnell, Engineers, 804 Scarritt Bldg., Kansas City, Mo., are preparing plans for electric lighting and water works; cost $45,000.

Canton, Kan.—Citizens have voted $30,000 bonds for installation of electric light plant and water works.

Linden, N. J.—Public Service Co. is considering extension of lines into town.—Harry Chandler, Elizabeth, Manager Electric Lighting Department.

Fargo, N. D.—Citizens will vote July 6 on bonds for installation of municipal lighting system and filtration plant.

Logan, Utah.—R. L. Campbell has asked for franchise for gas plant.

Racine, Wis.—Business men and merchants are considering some definite form of street lighting. T. W. Thiesen and J. J. Jones are interested.

CONTRACT AWARDED

San Francisco, Cal.—San Francisco Gas and Electric Co. has let a contract to R. D. Wood & Co., of Philadelphia for a 5,000,000 cu. ft. gas holder, having a diameter of 195 ft. and a height of 118 ft.

FIRE EQUIPMENT

Los Angeles, Cal.—Contracts are being prepared for furnishing 12,000 feet of fire hose.

Council Bluffs, Ia.—City will receive bids June 27 for an aerial hook and ladder truck and 1,000 ft. 2½-in. fire hose.

Washington, D. C.—Fire Chief Wagner desires motor-driven fire engine; $7,500 available.

Hanover, Mass.—Fire station will be erected at cost of $2,500.

Melrose, Mass.—Committee on Fire Department has recommended $5,500 appropriation for purchase of auto chemical.

Bayonne, N. J.—Council has decided to purchase combination chemical and hose apparatus at once.—Alfred Davis, Fire Chief.

Jersey City, N. J.—Engine house will be erected at Boulevard and Van Nostrand ave.; auto fire engine will be installed.—J. H. Morris, Chairman Committee on Apparatus.

Owego, N. Y.—Erection of fire house is being considered by Board of Trustees

Uhrichsville, O.—City did not sell $5,000 bond issue for fire department purposes; new bids will be asked.

Washington, C. H., O.—City has sold $6,000 fire department building bonds.

St. Clair, Pa.—Bids will be received June 20, noon, for erection of fire house for Alert Fire Co., No. 1.—C. E. Kendrick, Pottsville, Architect; G. W. Harrison, Borough Secretary.

CONTRACTS AWARDED

Elkhart, Ind.—Auto fire engine, to Webb Auto Co., $8,500.

Webster City, Ia.—Hose, 1,000 ft., 2½-in., to Voorhees Rubber Mfg. Co., Jersey City, N. J.

BRIDGES

CONTRACTS AWARDED

Cincinnati, O.—Building reinforced concrete bridge, to Kirchner Construction Co., $6,052.50.

Shamokin, Pa.—Bridge over Chillesquaque Creek, to J. S. McIlvaine, Chambersburg, $1,100.

Colfax, Wash.—Building three bridges over South Palouse, to A. Volk, Pullman, $7,960; also for bridge over Rock Creek, $3,200; bridge at Pullman over South Palouse, to O. H. Stanton, Spokane, $6,350.

MISCELLANEOUS

Gadsden, Ala.—City is investigating methods of street sweeping.

Sacramento, Cal.—Mayor M. R. Beard is in favor of extending the city wharf.

San Diego, Cal.—Council voted to submit to the people proposals for the issue of $3,500,000 in bonds for these purposes: Extension of water and sewer system and for other municipal improvements, $1,000,000; for the 1915 fair, $1,000,000; for a municipal gas plant, $1,500,000.

Hartford, Conn.—Street Commissioners are urging purchase of two autos.

Winsted, Conn.—Town has voted $10,000 appropriation to enlarge town hall.

Indianapolis, Ind.—City Engineer Klausmann will ask for auto truck for use of sewer engineering corps; Superintendent of Police Hyland has asked for gasoline patrol wagon; cost $4,645.

Lawrence, Mass.—Architect Adams has prepared plans for remodeling city hall at cost of $75,000.

Owosso, Mich.—Citizens will vote July 6 on $15,000 bonds for public building.

Dayton, O.—Landscape Architect Olmstead, Boston, will prepare plans for proposed park and boulevard system.

Chambersburg, Pa.—A bond election will be held, July 20, as follows: $150,000 water supply; $65,000 sewerage system; $15,000 paving; $5,000 fire house.

Philadelphia, Pa.—Council is considering $4,200 appropriation for Bureau of Lighting for purchase of two autos and carriage hire.

Wilkes-Barre, Pa.—Ordinance has been passed for the purchase of a dump wagon.

Erwin, Tenn.—Election will be held June 30 on $20,000 improvement bonds.

INCORPORATIONS

Atlanta Electric & Ice Company, Atlanta, Tex.; capital, $20,000. Incorporators: J. T. Chamblee, O. C. Oden and W. H. Erambert, Sr.

Bolton Light & Power Company, Bolton Landing, N. Y.; manufacture electricity; capital, $25,000. Incorporators: F. R. Smith, D. L. Rogers, S. G. Finkle, all of Bolton Ldg., N. Y., and two others.

Barbo-Electric Co., Camden, N. J.; manufacture coal, coke, gas, oil, electricity, light and heat; capital, $500,000. Incorporators: C. L. Walton, W. L. Bowen, H. G. H. Tarr, Camden.

The California Core Drill & Pump Company, Los Angeles, Cal.; capital, $500,000. Incorporators: L. R. Boyle, T. W. Staveet and W. G. French.

Consumers Power Co., Portland, Me.; electricity; capital, $20,000. Incorporators: A. G. McPherson, J. R. Parsons, and W. N. Bradley, all of Portland.

Farkas Tungsten Lamp Co., Bloomfield, N. J.; manufacturing electrical apparatus, lamps, tungsten lamps; capital, $200,000. Incorporators: W. W. Wilson, Pearl River, Rockland county, N. Y.; D. T. Gately, Brooklyn; N. G. Wells, Penn Yan, N. Y.

Great Northern Sand and Stone Company, New Castle, Pa.; capital, $20,000.

The Infallible Water Proofing Co., Wilmington, Del.; Delaware Trust Co.; capital, $100,000. Incorporators: F. M. Shive, S. E. Roberson, Harry W. Davis, all of Wilmington, Del.

High Pressure Construction & Supply Co., Millville, N. J.; construct railroads, water, gas and electric works, tunnels, etc.; capital, $100,000. Incorporators: S. J. Franklin, W. Owen, A. Brondriff, Jr., Millville.

Kankakee Power Company, Wilmington, Del.; Corporation Trust Co. of America; capital, $600,000. Incorporators: Warren N. Akers, Wilmington, Del.; William P. Brickett, Charles H. Weiss, both of Chicago, Ill. Attorney, Fam & Hurd, The Rookery, Chicago, Ill.

Moore Light Company, New York, N. Y.; general electrical and mechanical engineers and contractors; capital, $450,000. Incorporators: Raymonn A. Greene, Passaic, N. J.; Wm. R. Smith, 556 W. 184th st., New York; Isaiah Honigman, 122 W. 75th st., New York; John J. Brennan, 312 Second ave., New York, and one other.

Pecos and Toyah Lake Irrigation Company, Austin, Tex.; to build dams and canals and furnish water to cities and towns. Incorporators: J. N. Levin, R. S. Johnson, T. H. Beauchamp, all of Reaves county; F. E. Dobbins, C. A. Loomis, L. H. Baker, all Kansas City, Mo.; and F. W. Taylor, Lincoln, Neb.

Pittsgrove Gas Company, Norma, N. J.; capital, $30,000. Incorporators, S. J. Franklin, N. G. Livermore and Walter Owen.

Sampo-Granite Company, Quincy, Mass.; deal in granite, stone, etc; capital $50,000. Incorporators: Pres. Karl Kaugas; Treas. Konstant Tikkanen; Clerk. Ade Wuori, all of Quincy; Attorney, J. A. Anderson, 126 State st., Boston.

The Thompson-Smith Co., Oradell, N. J.; build railways, houses, turnpikes, etc., general contractors and construction work; capital, $25,000. Incorporators: G. C. Smith, Oradell; E. W. Selvage, Philadelphia, Pa.; H. N. Selvage, New York City; C. Smith, East Orange.

Triggs Smoke Prevention and Fuel Saving Company; Joseph Jackson Pierce, Wilmington, Del.; capital, $100,000. Incorporators: Charles H. Triggs, Walter P. Lewis, Andrew E. Sanhorn, Wilmington, Del.

Twentieth Century Portable Paving Machine Company, Chicago, Ill.; manufacture paving machines; capital, $15,000. Arizona corporation. Edw. G. Leszynsky, 205 La Salle st., Chicago, Ill.

Universal Engineering Co.; Delaware Char., Guar. & Trust Co., Wilmington, Del.; capital, $100,000. Incorporators: Osbert E. Williams, Charles A. Conant, Christian Schillinger, all of Scranton, Pa.

Wilkinson Water Purifying Co.; E. P. Stevenson, Wilmington, Del.; capital, $125,000. Incorporators: Mahlon Van Beaskirk, W. R. Van Beaskirk, both of Philadelphia, Pa.; A. P. Stevenson, Wilmington, Del.

BETTER GOODS FOR LESS MONEY

HEADQUARTERS FOR WATER WORKS SPECIALTIES

GLAUBER COCKS GLEVELAND, O.

SAMPLES AND PRICES FOR THE ASKING

4900 TO 5100 SUPERIOR AVE., CLEVELAND, O.

PROPOSALS

GRADING, PAVING, CURBING.

Pottsville, Pa.

Sealed proposals for the grading, curbing, paving and improving of Centre, Railroad and connecting streets in the Borough of Pottsville, Pennsylvania, will be received by the Town Council at the Council Chamber up to 7:30 o'clock P. M., of Tuesday, the 28th day of June, 1910.

Proposals to be addressed to G. A. Berner, Secretary, Town Council and endorsed "Proposals for grading, curbing, paving and improving Centre, Railroad and connecting streets."

The work for which proposals are invited consists of approximately:

7,125 Cubic yards of unclassified excavation.
14,600 Square yards of treated Wood Block or Vitrified Block Pavement on six-inch concrete foundation.
6,905 Square yards of Granite Block pavement on six-inch concrete foundation, Granite Blocks to be furnished by the borough.
5,288 Linear feet of Steel-Bound Granolithic Curbing.
503 Linear feet of Steel-Bound Granolithic Circular Curb.
7,140 Linear feet of old stone curbing to be redressed.
7,140 Linear feet of old stone curbing to be reset.
180 Linear feet of circular stone curbing.
500 Linear feet of stone edging.
3,700 Square feet of new Granolithic sidewalk.
15,000 Square feet of flagstone sidewalk to be relaid.
8,100 Square feet of new Brick sidewalk.
1,000 Square feet of old Brick sidewalk to be relaid.
2,500 Square feet of expanded metal for reinforcing concrete.

Each proposal must be accompanied with certified check upon one of the State or National Banks of Pottsville, Pennsylvania, drawn to the order of the Borough Treasurer, or money, to the amount of $1,000.00.

The Borough reserves the right to reject any or all bids, to waive any informality in the bids received and to accept any bid which it deems to be most favorable to the interests of the Borough.

Bidders are requested to make their bids upon the blank form prepared by the Engineer, a copy of which (with a proper envelope in which to inclose the bid), together with a copy of the instructions to bidders, contract and specifications, in the form approved by the Town Council can be obtained upon application therefor to the Engineer, at whose office the plans may be seen and any further information relating thereto may be obtained.

G. A. BERNER,
Secretary Borough Council,
303 N. Second St.,
Pottsville, Pa.

WILLIAM S. PUGH,
Engineer & Commissioner of Highways,
Offices, Morris Building,
Pottsville, Pa. (24)

WATER MAIN EXTENSION

Fort Smith, Ark.

Bids will be received by the Board of Public Affairs of the City of Fort Smith, Ark., for the construction of Water Main Extension, at ten o'clock A. M., July 6th, 1910. Plans and specifications on file in City Clerk's Office. Board reserves right to reject any and all bids. Separate bids will be received for Pipes, Specials, Hydrants, etc. Certified check for 10% of amount of bid must accompany each bid.

(24-25)

WATER WORKS AND ELECTRIC LIGHTING EXTENSIONS

Notice to Contractors

Cherokee, Okla.

Sealed proposals will be received at the office of the City Clerk, Cherokee, Okla., up to three (3) o'clock p. m. of Thursday, the 30th day of June, 1910, for furnishing material and labor and constructing extensions to the water works and electric lighting systems, separate bids being entertained as follows:

1. For furnishing material and labor (except such materials as are separately itemized in this notice) and constructing complete systems of water works and electric lighting; certified check $1,000.

2. For furnishing f.o.b. cars Cherokee, Okla., two compound duplex steam pumps, 500 gallons capacity; certified check $100.

3. For furnishing all material and erecting steel tower and tank of 70,000 gallons capacity, 120 ft. high; certified check $100.

4. For furnishing f.o.b. cars Cherokee, Okla., one Corliss engine for direct connection to 150-kw. alternating current generator mentioned under Division 5 of this notice; certified check $100.

5. For furnishing f.o.b. cars Cherokee, Okla., one 150-kw., 3-phase, 60-cycle, 2300-volt, alternating current generator, switchboard, transformers and street lighting equipment; certified check $200.

6. For furnishing material and constructing sanitary sewer outlet, 15-in. vitrified pipe, 18,940 ft. long, 4 to 12 ft. deep; certified check $1,000.

All of the above material to be furnished and work to be done in accordance with the plans and specifications on file at the office of the City Clerk, Cherokee, Okla., and at the office of the Engineers, Kansas City, Mo.

Any one desiring extra copies of the plans for personal use may obtain the same from the Engineers by making a payment of five ($5) dollars to cover the cost of the prints.

The city reserves the right to reject any and all bids.

A. J. TITUS, Mayor.
J. W. RACKLEY, City Clerk.

Burns & McDonnell, Engineers,
(24-25) Scarritt Bldg., Kansas City, Mo.

AERIAL EXTENSION LADDER

Office of the Commissioners of the District of Columbia
Washington, D. C.,
June 1st, 1910.

Sealed proposals will be received at this office until two o'clock, P. M., Friday, July 1, 1910, for installing a seventy-five foot aerial extension ladder and raising mechanism on one truck used in the Fire Department, D. C. Specifications and form of proposal may be obtained upon application to the Property Clerk, D. C., Room 316, District Building.

CUNO H. RUDOLPH,
JOHN A. JOHNSTON,
WILLIAM V. JUDSON.
Commissioners, D. C.

SEWERS

Cresco, Iowa.

The incorporated City of Cresco, Iowa. will receive sealed bids until June 20th, 1910, at 8 o'clock P. M. Construction of sewers as follows:

Sec. 1. Main sewer No. 2, about 1,900 feet 12-inch sewer.
Sec. 2. Main sewer No. 2, about 1,750 feet 12-inch sewer.
Lateral sewer No. 9, about 1,300 feet 8-inch sewer.
Lateral sewer No. 10, about 1,300 feet 8-inch sewer.

With suitable appurtenances. All in accordance with plans and specifications now on file with the City Clerk. Each of the above named sewers must be bid on separately. All bids must be accompanied with certified checks of One Hundred Dollars ($100.00) each, made payable without recourse to the City of Cresco, Iowa. The city reserves the right to reject any or all bids, to waive defects, and to accept any bid. All bids must be in sealed envelopes, marked on the outside, "Sewerage Bids," and addressed to P. J. McCullow, City Clerk. P. J. McCULLOW,
City Clerk.

W. L. RICHARDS, Engineer.

STREET PAVING

Sheridan, Wyo.

Sealed proposals for paving and constructing storm sewers on certain streets and avenues of the City of Sheridan, Wyo., described in Ordinance No. 269 of said city, will be special improvement district, designated as "Paving District No. 1," and Ordinance No. 269 of said city will be received by the City Council up to 8 o'clock p. m., of the 27th day of June, 1910, addressed to the undersigned, and endorsed "Proposals for Paving." The work for which proposals are invited consists of, approximately, 69,064 sq. yd. of creosoted wood blocks or vitrified brick pavement, 23,000 cu. yd. of excavation, 11,911 cu. yd. concrete foundation, 2400 lin. ft. concrete header blocks, and a system of storm sewers and catch basins, according to the plans and specifications on file in this office.

Each proposal must be made upon blanks furnished by the city, and accompanied with a certified check for 2½ per cent of the amount of the bid on some responsible bank other than the bidder and made payable to the City Treasurer of Sheridan, Wyo.

The successful bidder must execute a bond in the sum of 50 per cent of the contract price, with approved sureties. Plans and specifications may be inspected at this office.

Any one desiring a complete set of plans and specifications for personal use in submitting a bid may obtain the same by application to the City Engineer, and by payment of $5.00 to cover cost.

Payment will be made on monthly estimates of the City Engineer.

The city reserves the right to reject any and all bids.

By order of the City Council.
JAMES J. WITHROW,
(City Seal.) City Clerk.

PAVING

Marshalltown, Iowa.

Sealed proposals will be received at the office of City Clerk until June 20th, 1910, at 8 o'clock p. m., for paving certain streets and alleys.

Work comprises approximately 45,600 sq. yds. cement pavement, 24,300 lineal feet concrete curb, 12,700 sq. yds. brick block pavement and 4,800 lineal feet concrete curb.

For specifications, etc., address City Engineer.

SEWER CONSTRUCTION

Lancaster, Pa.

Sealed proposals will be received by the Street Committee, at the office of the City Controller, City Hall, Lancaster, Pa., until 12 o'clock, noon, Tuesday, June 28, 1910, for the following sewer work:

Sewers—About 2400 ft. of 60-in. brick or concrete and expanded metal storm sewer and two lines of 10-in. sanitary sewer on Stevens Ave. from Dauphin St. southward to a point midway between Susquehanna and Chesapeake Sts. and thence eastward to Conestoga Creek.

About 800 ft. of 36-in. brick and about 500 ft. of 24-in. pipe storm sewer on Susquehanna St. from Rockland St. to Conestoga Creek.

Plans and specifications for the above work can be seen at the office of the City Engineer, Lancaster, Pa.

A certified check for 5 per cent of the cost of work must accompany all bids.

The right to reject any or all bids is reserved. J. H. RATHFON,
City Controller.

Attest: J. A. Leinbach, Clerk.

CAST-IRON PIPE AND FIRE HYDRANTS

Muskogee, Okla.

Sealed proposals for 16,130 ft. (approximately 260 tons) 6-in. cast iron water pipe and 40 4-in. Corey steamer fire hydrants, delivered f.o.b. Muskogee, will be received by the City of Muskogee, Okla., until July 5, 1910. Check for $500, certified by a Muskogee bank, payable to the City of Muskogee.

Address: CHAS. WHEELER, JR.,
City Clerk.

FURNISHING WATER METERS

Office of the Commissioners, D. C.
Washington, D. C.

Sealed proposals will be received at this office until 2 p. m., Monday, June 27, 1910, for furnishing water meters. Blank forms of proposal, specifications, and all necessary information may be obtained from the Chief Clerk, Engineer Department, Room 427, District Building.

CUNO H. RUDOLPH,
JOHN A. JOHNSTON,
WILLIAM V. JUDSON,
Commissioners, D. C.